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CONTENTS

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THE GENUS MAIZANIA BGT. (GASTROPODA, MAIZANIIDAE) IN EASTERN AFRICA

By

BERNARD VERDCOURT
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Introduction

The genus Maizania was erected by Bourguignat in 1889; Thiele (1929) considered it to be a subgenus of Ostodes Gould but Bequaert and Clench (1936), who discussed the genus more fully than anyone else up to that time, quite correctly refuted this idea. They divided the genus into three subgenera, Maizania s.s., Maizaniella Bequaert and Clench, and Thomeomaizania Bequaert and Clench, but only the former occurs in Eastern Africa. They list nine species in this subgenus and describe one new species (M. zanzibarica) but also omit a previously described species, M. lugubris Preston, which is closely similar to their new one. Pilsbry (1919, fig. 162) gives a map showing the distribution of the genus as a whole. Tierlecke (1940) considered that the genus should be placed in a separate family. Taylor and Sohl (1962) have accepted this view and I have followed them here.

I have examined the radulae of a number of species and races and since certain radula characteristics are associated with shell size I have divided the subgenus Maizania into two sections.

Section Maizania
Shell large, exceeding 8 mm. in width; central tooth of the radula with three cusps.

Section Micromaizania new section
Shell small, not exceeding 8 mm. in width; central tooth of the radula with five cusps.

Thiele (1929) figures the radula of M. preussi and shows the central tooth with three cusps.

The following list gives, so far as I am aware, all the names associated with the subgenus.
Maizania Bourguignat, Moll. Afr. Equat. 148 (1889) (genotype M. olivacea Bourguignat)
Synonyms: Cyclophorus subg. Aferulus von Martens (1897) (subgenotype chosen by Bequaert and Clench as M. olivacea Bourguignat)
Cyclophorus subg. Natalia Godwin Austen (1897) (subgenotype Cyclostoma wahlbergi Benson)
Hijabia Godwin Austen (1898) (new name for Natalia)
Austrocyclus Ancey (1898) (genotype chosen by Bequaert and Clench as Cyclostoma wahlbergi Benson)
Cyclophorus section Cyclophoropsis Dautzenberg (1908) (type of section Cyclophorus hildebrandti von Martens)
Specific and varietal names: Cyclophorus wahlbergi Benson (1852), Cyclophorus angolensis Dohrn (1878), Cyclophorus hildebrandti von Martens (1878), Cyclophorus magilensis Craven (1880), Maizania olivacea Bourguignat (1889), Cyclophorus elatior von Martens (1892), Cyclophorus volkensi von Martens (1895), Cyclophorus intermedius

von Martens (1897), Cyclophorus rugosus Putzeys (1899), Cyclophorus intermedius var. cingulatus Dupuis and Putzeys (1901), Cyclophorus kibonotoensis D'Ailly (1910), Aferulus lugubris Preston (1910), Aferulus intermedius var. angolensis Preston (1910), Maizania zanzibarica Bequaert and Clench (1936), Maizania marsabitensis Verdcourt (1963).

Three fossil species have also been described (Verdcourt, 1963a) and these will be discussed later.

It is unfortunate that amongst the fairly extensive collections of the genus which I have gathered together at the Coryndon Museum, there is nothing which matches the figure given by Bourguignat of his M. olivacea, the genotype. The nearest match is a small juvenile collected by myself on Kilimanjaro. I therefore wrote to Paris and Prof. Fischer kindly arranged for a photograph of the type to be sent to me; with his permission I have reproduced it here (fig. 1).

The species are difficult to separate, chiefly because the populations are separated and each population differs slightly in dimensions; there are few definite characters apart from the ratios of dimensions and colour. Whilst searching for characters by going over the material many times, uninfluenced by labels, a constant character was found in the striation which is correlated with geographical distribution. M. wahlbergi and M. zanzibarica have close, rather regular, raised striae, whereas M. hildebrandti has distinctive, spaced, dark costae with faint striae between. This is, I consider, an important character which has helped solve the relationship of the Natal forms to those occurring in East Africa. It is extremely difficult to decide whether M. hildebrandti and its relatives represent distinct species or only races. If extremes are compared e.g. M. hildebrandti hildebrandti and M. hildebrandti thikensis, one would doubtless decide that they could not possibly be considered conspecific, but other areas produce intermediate forms which are, however, constant for a given area. Mere size appears to be a poor character because, although it is probably constant in any one locality, juveniles of a large race may exactly resemble adults of a small race. One cannot help but think that arrested development of the shell has been involved in evolution and in some way fixed.

Key to the East African Species of Maizania

1. Shell always minute, never more than 8 mm wide (Micromaizania) 2
1. Shell larger (Maizania sensu stricto)..... 3

2. Shell conical, umbilicus narrow; 3.7-6 x 3.3-4.7 mm. ..... 1. volkensi
2. Shell depressed, umbilicus wide, 6.75 x 4-4.5 mm ..... 2. marsabitensis

(Note: juveniles of larger species will key here and they can only be recognised by experience - the apical whorl is larger and there is usually one whorl less for shells of the same size; also with experience the non-adult state can be recognised by the appearance of the aperture)

3. Shell conical, not very depressed, dark brown, almost always with traces of pale bands but very vague in Western Tanganyika forms ..... 7. elatior
3. Shell conical or depressed, usually a pale chestnut brown, never banded 4

4. Spire angle about 80°..... 6. olivacea
4. Spire angle much more obtuse 5

5. Shell sculptured with very close costulae developed into faint lamellae; umbilicus always widely open and shell depressed; coastal species 6
5. Shell sculptured with spaced costulae which are frequently developed into lamellae; umbilicus open or narrow; upland species 7

6. Shell with spire almost flat ..... 3. zanzibarica
6. Shell with spire distinctly raised ..... 4. wahlbergi

7. Shell attaining 25-30 mm in breadth 8
7. Shell usually under 20 mm wide, rarely attaining 22 mm 9

8. Shell higher, apical angle about 100°... 5b. hildebrandti elevata
8. Shell more depressed, apical angle about 120°..... 5a. hildebrandti hildebrandti

9. Shell small, under 15 mm wide; apical angle about 120°..... 5d. hildebrandti thikensis
9. Shell larger, up to 22 mm wide; apical angle 100 - 120°..... 5c. hildebrandti kibonotoensis

The West African species are clearly quite distinct and Bequaert and Clench have erected the subgenus Maizaniella for them. M. leonensis (Morelet) (Sierra Leone, Liberia) is similar in shape to M. marsabitensis Verdcourt but is strongly ribbed; M. lilliputianus (Morelet) (Gaboon) is also sublamellate; M. preussi (von Martens) (Cameroons) of which M. costulatus Boettger (? MS) may be a synonym, is closely allied to M. leonensis but larger - it does not belong to Maizania proper as Bequaert and Clench thought possible, but they had seen no material. Two Congo species, M. lukolelensis Bequaert and Clench (and its var. chapini Bequaert and Clench) and M. chondrocycloides Bequaert and Clench also belong to Maizaniella, the former being close to M. lilliputianus. The S. Tome species M. vandellii (Nobre) is placed by Bequaert and Clench in their subgenus Thomeomaizania which is justified since the spiral rows of tubercles are very distinctive. The other species from S. Tome, formerly referred to Cyclophorus, they place in their genus Afroditropis.

Enumeration of the Species

The following abbreviations are employed:

CM - Coryndon Memorial Museum, Nairobi.

B - Zoological Museum of the Humboldt University, Berlin.

BM - British Museum (Nat.Hist.), London.

S - Natural History Museum, Stockholm.

ANSP - Academy of Natural Sciences, Philadelphia.

P - Laboratory of Malacology, National Museum of Natural History, Paris.

1. M. volkensi (von Martens, 1895)
Cyclophorus volkensi von Martens, Sitzb. Ges. Naturf. Fr. Berlin 121 (1895) and Deutsch Ost-Afr. 4, Beschalte Weichth. 9, pl.2, fig. 6 (1897)

2. M. marsabitensis Verdcourt, Archiv. Mollusk. 92: 16, figs. 1,2a,b (1963)

These two species are adequately dealt with in a previous reference (Verdcourt, 1963b)

3. M. zanzibarica Bequaert and Clench, Rev. Zool. Bot. Afric. 29: 100, pl.1, figs. 5-7 (1936)

This species is characterised by its very depressed shape; it is obviously closely related to M. wahlbergi (Benson) and abundant material might indicate that it deserves only subspecific rank. Only a very small amount of material has been seen.

		Height	Breadth	Aperture diameter
ZANZIBAR.	Chuaca (Chwaka) (BM, paratype)	9	15.5	7
	Jembiani, 5m. S of Paje (Ostheimer in ANSP 213082)	13.1	20.1	9.4
	Chwaka (Ostheimer in ANSP 214525)	9.2	14.6	7.2

A specimen in the Berlin Museum from the Paetel collection labelled Zanzibar is M. wahlbergi and is probably wrongly localised. It doubtless was collected on the nearby mainland which was often called Zanzibar in the last century.

4. M. wahlbergi (Benson, 1852)
Cyclophorus wahlbergi Benson, Ann. Mag. Nat. Hist. (2) 10: 271 (1852); Smith, Proc. Zool. Soc. Lond. 277 (1881); von Martens, Deutsh Ost-Afr. 4, Beschalte Weichth. 9 (1897)
Aferulus lugubris Preston, Ann. Mag. Nat. Hist.(8) 6: 536, pl.9, fig. 27

This species is characterised by its low form, wide umbilicus and close, rather regular striae which are sometimes developed into very close lamellae. Kenya material does not merit even a racial name although it seems to attain a slightly larger size.

KENYA.	Shimba Hills (BM, paratype)			
	Vipingo	19.5	28.5	13.0
	(B. Verdcourt, CM)	16.5	24.0	10.5
	Sokoke Forest	15.0	21.0	10.0
	(J.G. Williams, CM)			
	Diani Beach, San Diego	20.0	29.0	14.0
	(H. Copley, CM 1040-1044)	17.0	24.5	12.0
		16.0	23.5	11.0
		16.0	24.0	11.0
		15.0	21.5	10.5
	Kikambala			
	(H. Copley, CM 2591)	15.5	24.0	11.2
TANGANYIKA	East Usambaras	7.0	11.5	5.0
	(B. Verdcourt, CM)			
	Between L. Nyasa and the coast	11.0	16.5	7.5
	(Thomson, BM)			
	Tanga (Karasek, B)	no data recorded		
	Kitohaui (Lieder, B)	no data recorded		
	(Note: the two last were determined by von Martens as wahlbergi but I saw the specimens before I realised the true characters of this species).			
ZANZIBAR.	Locality dubious, almost certainly from East African mainland (ex Paetel collection, B)	18.0	24.0	12.0
NATAL.	Zulu country (BM)	11.0	17.5	--
		12.0	17.5	9.0
	Port Natal (BM)	12.5	16.5	8.0
		12.0	15.5	8.5
		11.0	15.5	8.0
	Port Natal	19.5	19.5	9.0
	(W. Jardine, BM)	to	to	to
		12.0	17.5	8.0
	Port Natal	12.0	15.5	8.5
	(57.1.16.16 BM)	9.5	11.5	5.5
	Port Shepstone	17.0	24.5	11.5
	(H.C. Burnup, BM)	17.5	23.5	11.5

	Cape Natal	15.5	21.0	10.0
	(Dr. Strangie? ex Mus.Cum., BM)	15.0	20.5	9.5
	Durban (W.T. Blanford ex coll. Godwin Austen, BM) (Note says animal drawn & dissected, Nov. 1896)	15.0	18.5	9.5
CAPE PROVINCE	Port St. Johns (Power - cited by Connolly)	18.8	23.5	11.5

5a. M. hildebrandti hildebrandti (von Martens, 1878)
Cyclophorus hildebrandti von Martens, Monatsb. Akad. Wiss. Berlin 289, pl.1, figs. 1-3 (1878) and Deutsch Ost-Afr. 4, Beschalte Weichth. 8 (1897)

This is undoubtedly specifically distinct from M. wahlbergi although superficially very similar in appearance, more so in fact than it is to other races of hildebrandti. The shell attains a large size and there are spaced dark ribs; the umbilicus is much narrower than it is in M. wahlbergi but wider than it is in M. hildebrandti elevata. M. hildebrandti and its races are of a much paler colour than M. elatior. In a footnote to Pilsbry's account (1919, p. 326) J. Bequaert suggests that M. elatior, M. hildebrandti, M. intermedius and M. rugosus are merely variations of a single specific type and that nothing in the distribution of these forms allows one to consider them as geographical races, but this is definitely not true so far as M. hildebrandti is concerned.

KENYA	Kibwesi	25.0	30.0	16.0
	(B. Verdcourt, CM)	24.0	28.0	15.0
		16.0	20.5	10.0
	Kitui	20.0	28.0	13.5
	(Hildebrandt, holotype, B).			
	Ditto from description	19.5	28.3	14.0
	Kibwesi	17.0	23.0	13.0
	(C. Harries, CM)	6.5	12.0	5.5
		5.5	10.5	5.0
	Kibwesi	22.5	27.5	14.0
	(R.M. Polhill &	21.0	26.0	13.0
	B. Verdcourt 17, CM)	18.0	25.0	13.0
		14.0	18.0	8.5
		8.5	12.5	6.0
	Kibwesi, Chai Dam	24.5	29.5	14.5
	(S. Coryndon, CM)	21.0	25.0	13.0
		20.5	25.5	12.5
	Makindu	17.5	22.0	11.5
	(S. Coryndon, CM)	17.0	22.0	11.2
		16.0	21.0	10.5
		7.2	11.0	5.2

The following material is too poor to place but is certainly a form of M. hildebrandti.

KENYA.	Chyulu Hills (H.F. Allen Turner, CM F 324)	9.5	11.5	6.0

5b. M. hildebrandti elevata Verdcourt new subspecies

This subspecies is characterised by having a more lamellate periostracum than any of the others; it also attains a larger size and has a narrow umbilicus. The lamellae are most evident in younger snails and tend to become rubbed off with age but they are always obvious. It is restricted to the ancient mountain blocks in the north east and eastern parts of Tanganyika, and is most closely related to M. hildebrandti kibonotoensis.

TANGANYIKA.	Uluguru Mountains, Bunduki (J. Bond, holotype & paratypes BM; paratypes CM)	25.0 HT 22.0 14.0 12.0 9.5	30.0 25.0 19.0 14.0 12.5	16.5 13.5 10.0 7.5 7.0
	East Usambaras (Rolle, B)	17.0 16.0	20.5 21.0	11.5 10.0
	East Usambaras, Amani (Vosseler, B)	no data recorded		
	East Usambaras, Nderema (L. Conradt, B)	no data recorded		
	East Usambaras, Amani, Bomole (B. Verdcourt, CM)	18.5 14.0 8.0	21.5 15.5 12.0	11.0 9.0 6.0
	East Usambaras, Ngua (B. Verdcourt, CM)	15.0	19.5	10.5
	West Usambaras, Magamba, Mkusi (B. Verdcourt, CM)	5.5	9.0	4.2
	Without locality (Methner, B)	no data recorded		

A shell from Ukami (BM, ex Sykes collection), i.e. the area immediately north-east of the Uluguru Mountains has the last whorl very lamellate and is taller than shells from the Usambaras but probably belongs to this subspecies; it measures 22.0 x 21.5 x 11.5-13 mm. There is also a juvenile shell from Ukami in the Berlin Museum.

Cyclophorus magilensis Craven, Proc. Zool. Soc. Lond. 218, pl.22, fig. 1 (1880) has long been a puzzle and a number of shells from varying localities have been referred to this name in the past. The name is, however, best dismissed as being based on unidentifiable material. In the collections of the British Museum (Nat. Hist.) there are the holotype and two paratypes, all very worn, white,

juvenile shells. The largest shell measures 8.5 x 12.0 x 5.0 mm and the sculpture is not preserved. The type locality, Magila, in the foothills of the East Usambaras near Mt. Mlinga suggests that it might be referable to M. hildebrandti elevata but one lot of two juveniles I collected at Amani, actually in the East Usambaras, has proved to be a mixture of M. wahlbergi and M. hildebrandti elevata, thus showing that the two occur together. I have not therefore used Craven's name.

5c. M. hildebrandti kibonotoensis (D'Ailly, 1910)
Cyclophorus kibonotoensis D'Ailly, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro 1 (6): 3 (1910)

The types have a rather elevated shell with the apex roseate; the umbilicus is narrow and the costae dark and well-spaced. Although undoubtedly close to M. hildebrandti hildebrandti, it never attains such a large size. The Masuku Plateau specimens were referred to M. intermedius by Smith (1899) but there is no doubt that they belong to M. hildebrandti; there are some slight differences e.g. the apices are not roseate but the costae are dark, spaced and have faint striae between them. Material from Mt. Kulal bears some resemblance to M. elatior von Martens but is more depressed and the periostracum more lamellate. Specimens from Marsabit are distinctly more elevated than those from Kulal but otherwise very similar. There is no good reason why these populations, though isolated and perhaps statistically separable, should be treated as separate races - the differences are too slight.

KENYA.	Mt. Kulal, 5-7000 ft.	14.0	20.0	9.5
	(B. Verdcourt, CM)	13.0	18.5	9.0
		13.0	19.0	9.0
		12.5	17.5	8.5
		12.0	17.0	8.0
		12.0	17.0	8.5
		12.0	16.0	7.8
		11.5	17.0	8.0
		11.0	17.0	8.5
		11.0	16.5	8.0
		11.0	16.0	8.0
		10.5	16.0	7.7
		6.5	10.0	5.0
	Mt. Kulal	17.0	22.0	11.0
	(J. Alexander, CM)	14.5	18.5	9.0
		14.5	18.5	8.5
		14.5	18.5	9.0
		14.5	19.5	9.5
		14.5	19.0	9.0
		14.0	19.0	9.0
		14.0	18.5	9.0
		14.0	18.0	8.8
		14.0	18.0	9.0
		14.0	18.0	9.5
		13.5	18.0	8.8
		13.0	19.0	9.0
		13.0	18.0	8.5
		13.0	16.5	8.5
		13.0	17.5	9.0
		12.5	17.0	8.5
		12.5	16.5	8.0

		12.0	15.5	7.5
		12.0	17.0	8.0
		12.0	18.0	8.8
		12.0	17.0	8.0
		12.0	16.5	8.0
		11.5	15.5	7.0
		11.0	16.5	8.0
		8.8	11.5	6.2
	Mt. Marsabit	12.5	16.0	8.0
	(J. Adamson &	12.5	16.5	8.0
	J.G. Williams, CM)	12.5	16.5	8.0
		11.0	14.0	7.0
		9.5	12.5	6.0
		9.0	12.5	6.0
		8.5	11.5	6.0
		8.0	11.5	5.5
		6.5	9.5	4.5
	Mt. Marsabit	13.0	17.0	7.5
	(B. Verdcourt, CM)	13.0	17.0	8.0
		13.0	16.0	8.0
		12.5	15.0	8.0
		12.0	16.0	7.5
		12.0	15.0	7.5
		11.5	14.0	6.8
		11.5	14.5	7.0
		11.0	15.5	7.5
		11.0	14.5	7.5
		10.5	14.0	6.5
		10.5	14.0	6.5
		10.5	14.0	7.0
		9.5	13.5	6.3
		9.5	14.0	7.0

Mathews Range material is slightly wider than Kulal material.

	Mathews Range, Wamba	17.0	22.0	10.5
	(Opiko, CM)	15.0	20.0	10.0
		14.5	20.5	10.0
		10.5	15.5	7.5
TANGANYIKA.	Kilimaniaro, Kibonoto	14.5	18.0	9.0
	(Y. Sjöstedt, holotype,			
	S, three paratypes, BM)			
	Ngurdoto Crater	16.0	19.0	9.0
	(L.D. Verdcourt, CM, BM)	15.0	19.0	9.0
		12.0	16.5	8.0
		11.0	4.5	7.0
NYASALAND.	Masuku Plateau,*	no data recorded		
	6000-7000 ft.			
	(H.H. Johnston)			

* i.e. Misuku Hills, 33° 32' E., 9°42' S.

5d. M. hildebrandti thikensis Verdcourt new subspecies

This subspecies has the spaced dark ribs of M. hildebrandti but is depressed and uniformly small in size; the apex is roseate as in M. hildebrandti kibonotoensis. The worn types of Cyclophorus magilensis Craven are very similar to this subspecies but they are distinctly juveniles of a much larger form. It is interesting to note that an Euonyma from the same locality also shows 'arrested' juvenile characteristics.

KENYA.	Thika, Chania Gorge	9.5	14.0	6.2
	(B. Verdcourt, CM)	9.5	14.5	6.5
		9.0	13.0	6.0
		9.0	14.5	6.5
		8.5	12.5	6.0
		8.5	13.2	6.0
		8.5	13.0	6.0
		8.2	13.0	6.2
		8.0	14.0	6.5
		7.5	12.5	6.0
		7.5	12.5	6.0
		7.5	13.0	5.5
		7.0	12.0	5.5
		7.0	12.0	5.5
		7.0	11.0	5.5
	Same locality	10.0 HT	14.5	6.7
	(R.M. Polhill 113,	10.0	14.5	6.7
	holotype & paratypes,	10.0	14.5	6.7
	BM; paratypes CM)	9.5	15.0	6.7
		8.5	13.0	6.2
		8.0	13.5	6.0
		5.0	8.5	4.2
		4.5	7.5	3.7
		4.5	7.5	3.7

6. M. olivacea Bourguignat, Moll. Afr. Equat. 148, pl.7, figs. 14-18 (1889)
Cyclophorus olivaceus Bourguignat; von Martens, Deutsch. Ost-Afr. 4, Beschalte Weichth. 9 (1897)

Bourguignat's species is apparently quite distinct from the forms occurring in the Ulugurus and Usambaras. Lamellae are not mentioned in his description nor are they visible in the figure or in the photograph of the type. This photograph shows a shell much more acute than that of any of the subspecies of M. hildebrandti. Topotypic material is however required to elucidate the true position of this form, since the type is not adult. A small juvenile shell I collected at 9000 ft. on the Marangu track, Kilimanjaro might belong here but has an apical angle of over 90°; it measures 6.5 x 5.2 mm.

TANGANYIKA.	Summit of Nguru Mts. 2,000 m. (holotype, P)	12.0	12.0	6.5

7. M. elatior (von Martens, 1892)
Cyclophorus elatior von Martens, Sitzb. Ges. Naturf. Fr. Berlin 180 (1892) and Deutsch Ost-Afr. 4, Beschalte Weichth. 8, pl.1, fig. 1 & pl.2, fig. 4 (1897); Smith, Trans. Zool. Soc. Lond. 19: 47 (1909); Thiele, Wiss. Ergebn. Deutsch Zentr. Afr. Exp. (1907-8) 3: 210 (1911)

C. intermedius von Martens, Deutsch Ost-Afr. 4, Beschalte Weichth. 8, pl.2, fig. 3 (1897); Thiele, loc. cit. 210 (1911); Dautzenberg and Germain, Rev. Zool. Afric. 4: 48 (1914); Pilsbry, Bull. Am. Mus. Nat. Hist. 40: 325 (1919)

Cyclophorus rugosus Putzeys, Ann. Soc. Malacol. Belg., Bull. Séances 34, 55, fig. 1 (1899)

C. intermedius var. cingulatus Dupuis and Putzeys, Ann. Soc. Malacol. Belg. Bull. Séances 36, 41, figs. 17-18 (1901)

Aferulus intermedius var. angolensis Preston, Proc. Malac. Soc. 9: 55 (1910)

? Cyclophorus angolensis Dohrn, Jahrb. Deutsch. Mal. Ges. 5: 151 (1878)

It will be seen from the synonymy that there may be an older name for this species than the one I have used. Dohrn's type has not been traced but the description is of a dark shell measuring 16 x 21 x 11 with the aperture bluish within; there is no mention of pale bands. The type locality is extremely vague - "in provincia Angolensi" and no figure is given. It is very likely identical with the Kungwe material but practically no material has been seen from Angola. Since Dohrn's species may be a distinct form never recollected I am not using the name. Kenya and Tanganyika material shows rather more widely spaced ribs and the bands are obscure or practically non-existent. This material shows some approach to forms of M. hildebrandti, e.g. Kenya elatior is very similar to M. hildebrandti kibonotoensis from Marsabit but the darker colour separates them.

Pilsbry (1919) gives a good account of the Congo material he examined. He particularly notes the variation in spacing of the ribs. I have not seen any of the unbanded material he mentions but some, e.g. that from Penge must be very similar to Kungwe material. I had intended to treat the material from western Tanganyika as a separate race but insufficient material has been seen; other single specimens from throughout the range of the species seem equally distinctive. Racial distinctions will, however, be necessary and there is for example a wide difference between the very small specimens from the Sudan and the large specimens from Tschibinda.

Typical elatior is readily recognised by its elevated form, very narrow umbilicus and dark colour with pale spiral bands; the periostracum is not so lamellate as in other species.

Mr. M.R. Block has communicated some details of a specimen collected by Mrs. D.P. Irwin in Kakamega Forest on old leaves in damp undergrowth. He managed to keep the snail alive in England for a month or so. "The animal was very shy but would emerge and crawl about at any time of day or night provided it had a moist atmosphere of about 60°F. The most striking feature was its colour, a bright shrimp-pink shaded to a deeper colour about the snout and with orange-red tentacles, which folded back along the sides when the creature withdrew its head. The body was finely rugose, the oval rugae difficult to see save in certain lights. The foot was not divided longitudinally as in Cyclostoma. I never saw this snail eat though I gave it a wide variety of foods e.g. fungi, leaf-mould, rolled oats and algae and moss. Microscopical examination of the faeces (the remains

of its last meal in Africa) showed tiny fragments of leaf epidermis, plant hairs, short lengths of fungal hyphae, round green algal cells and various spores. I therefore concluded that it was a detritus-feeder. The faeces were tiny oval pellets quite unlike the coiled masses produced by the Helicidae".

SUDAN.	Nagichot, Didinga Mts. (G.D. Hale Carpenter, BM, CM)	11.0	12.5	6.7
		10.2	11.5	6.2
		10.0	11.5	6.2
		9.8	11.0	5.7
		9.7	11.5	6.2
CONGO.	Tschibinda (F. Hendrickx, CM)	18.5	23.0	13.0
	Nsendwe (paratype of var. cingulata, Dupuis & Putzeys, BM)	12.2	14.3	7.0
UGANDA.	Mabira Forest (R.L. Harger, BM)			
	Bugoma Forest, 4000 ft. (C.R.S. Pitman, BM)			
	Ruwenzori (1907. 12.11.64-6, BM)			
	sine locality (Capt. Powell Cotton, BM)			
	Ruwenzori, Mobuku Valley (G.H. Yeoman, CM)	15.0	24.0	10.0
	Ruwenzori, Byuku Valley, Nyamleja (G.H. Yeoman, CM)	12.0	15.5	8.7
	Ruwenzori (G.D. Hale Carpenter, BM)			
	Entebbe (E. Degen?, BM)			
	Entebbe (G.D. Hale Carpenter, CM)	14.5	17.0	9.5
	Toro (G.D. Hale Carpenter, CM)	13.5	15.2	8.2
		13.5	15.2	8.2
		13.0	16.0	8.5
		11.0	13.2	7.2
		10.5	12.5	7.0
KENYA.	Kapsabet, Nandi Forest (M. Powell, CM)	20.0	22.5	11.5
		20.0	21.8	11.5
		18.0	21.0	11.0
		16.8	19.5	10.5
		16.5	18.5	10.0

KENYA (Contd.)	Kakamega Forest (E. Pinhey, CM)	12.5	14.0	8.0
	Kakamega Forest	17.0	19.0	10.3
	Yala River	15.0	17.0	9.5
	(M. Powell, CM)	13.5	16.5	9.0
		12.5	13.5	7.5
	Kakamega Forest	14.5	18.0	9.5
	(B. Verdcourt, CM)	14.0	17.5	8.8
	Kakamega Forest	16.5	18.0	9.5
	(S. Cary, CM)	13.0	15.5	8.3
	Kakamega Forest	18.0	20.5	11.0
	(J. Morris-Goodall,	16.5	18.5	10.0
	CM)	15.0	17.5	9.5
		15.0	17.0	9.2
		14.0	17.0	9.0
		14.0	16.2	8.0
		12.5	15.5	9.0
		12.5	14.5	8.5
		10.5	13.0	7.2
TANGANYIKA	Kungwe Mt. south	12.5	17.0	8.5
	ridge, 6000 ft.	11.0	16.0	7.5
	(D.H. Eccles, CM)			
	Kungwe Mt., 5000 ft.	13.0	17.8	8.5
	(J. Newbould, CM)	12.5	16.5	8.2
	Kungwe Mt.	12.0	17.5	8.5
	(J.A.L. Cooke, CM)	11.0	16.0	7.8
	Lukandamila, 5000 ft.	19.0	23.0	12.5
	(D.H. Eccles, CM)			
	Buha District,	14.0	18.5	10.0
	Gombe stream chimp-	14.0	18.5	9.0
	anzee reserve,	13.5	17.5	8.5
	Kasakela 16 miles N.	13.5	16.0	8.0
	of Kigoma	13.5	17.0	8.5
	(B. Verdcourt CM)	13.0	16.0	8.0
		12.5	16.0	8.0
		12.0	15.5	8.0
		12.0	14.0	7.0
		11.5	14.5	7.5
		10.5	14.5	7.0
		9.5	13.0	7.5
ANGOLA.	200 miles E. of Loanda (paratypes of A. intermedia var. angolensis Preston, BM)	15.0	17.0	9.0

Discussion of the Distribution of the Species

From wherever Maizania was first derived it is undoubtedly an evergreen forest group in origin. It has affinities with groups both in Tropical America and in Asia. In the past Maizania has been considered as a subgenus of Cyclophorus, an eastern genus, but its present treatment as a separate family suggests that it is an isolated genus of ancient origin. It seems likely also that the basic subdivisions of the genus diverged long ago, but until anatomical studies of a fair proportion of the species are available it is not possible to decide how closely related to each other they are. Thomeomaizania and Maizaniella are purely S. Tome and Guinean groups respectively.

The Congo forest is undoubtedly a very old vegetation type and, as is well known, this type of forest extends down into western Tanganyika and across to Kenya, but it has not existed with its boundaries static any longer than other vegetation types in eastern Africa. There was for instance a large lake in the Congo basin during the Pliocene. From Angola to the southern Sudan and ranging throughout the eastern part of this vegetation type, Maizania elatior is found, usually on the swampy banks of streams subject to periodical inundation. Bequaert (in Pilsbry, 1919) gives an account of the favoured habitats and I found the species near Kigoma under identical conditions. In Kakamega Forest, however, the species lives under slightly drier conditions under leaf ltter. One is tempted to consider this species as probably an old one but it is an extremely variable and plastic taxon. M. wahlbergi appears to exist in two disjunct areas since it seems unlikely that this rather large species has been entirely overlooked in Mozambique, although it must be admitted that there is little published literature about that area and I have seen no local collections in that country. A large number of species of plants and animals extend from Port Elizabeth and Natal up to East Africa and were probably well distributed inland as well. A considerable number are now left as relicts in scattered areas or are compressed into the coastal strip by inland tectonic and climatic changes. A typical example of a plant still widely distributed is Xymalos monospora (Harv.) Baill. ex Warb., an ancient species which occurs in evergreen forest throughout much of East Africa including forest on isolated mountain tops from 900 - 2700 m; it also extends to the Cameroons, Fernando Po and South Africa. Maizania has a more or less parallel distribution. Pseudobersama mossambicensis (Sim) Verdcourt is a species of the coastal strip alone from Natal to Kenya and its distribution parallels that of M. wahlbergi. Heywoodia lucens Sim has a remarkably disjunct distribution, occurring in Uganda (Ankole), Kenya (Thika and Kitui areas), Tanganyika (Minziro Forest, Bukoba) and the coastal evergreen forests of South Africa. This distribution indicates that there were evergreen forest links probably during the Miocene or before, all over the areas inhabited by Maizania. M. zanzibarica is very closely related to M. wahlbergi and probably is only a depressed subspecies. It may of course be older in the sense that the ancestor of both was a depressed form. M. hildebrandti is in part confirmed to Tertiary and Recent volcanic areas but one subspecies, ulugurensis, is found in forest areas on ancient basement complex rocks which have had connections with the rain forest to the west of the continent in the past. M. olivacea is confined to a similar but less ancient forest area. M. volkensi occurs in both old and recent volcanically disturbed areas but is so small that racial differences are not apparent, although on Marsabit the related depressed M. marsabitensis and a third undescribed race

or species have been found. The larger M. marsabitensis might be looked on as a step on the way to M. volkensi but if so it is strange that similar forms have not been found elsewhere. The Marsabit forest seems to be very similar in content to the Kenya highlands and must have been part of the extensive similar forests which stretched to the Ethiopian highlands. It does not appear to be an ancient relict area but may of course be on the site of an ancient highland area rising above the Miocene peneplain, subsequently much altered but not destroyed entirely during later volcanic activity. So little of Africa has been adequately explored that negative distribution evidence can be of little or no value. The racial segregates found in M. hildebrandti can be attributed to the isolation of habitats caused by the extensive Pliocene and Pleistocene geological upheavals and the race kibonotoensis is characteristic of isolated evergreen forest areas on volcanic rocks.

There is very little fossil record of Maizania. I have described several from the Miocene of Rusinga (Verdcourt, 1963b) and similar material has also been found in the Leopard Caves, Mt. Elgon in beds probably younger than the Miocene. All this material has the surface sculpture poorly preserved but it is certain that at least the majority and perhaps even all of it is close to M. hildebrandti hildebrandti, since traces of widely spaced ribbing are apparent. They are big forms similar to M. hildebrandti hildebrandti but some are very depressed and widely umbilicated, more so than any existing species. Depressed and elevated species occur in exactly the same beds and were thus contemporaneous as they are today. It does not appear that degree of elevation, which is due to tightness of coiling, can be looked upon as a primitive or advanced character, but that the physiological cause is a delicately balanced one and variation occurs readily. It would not appear to be due to environment (humidity and temperature, etc.) since depressed and elevated forms occur together at Marsabit. Depressed, widely umbilicated forms are today mostly confined to the coastal areas. In Miocene times it is evident that large forms closely resembling M. hildebrandti hildebrandti were widely spread and that the smaller races evolved during the extensive Tertiary climatic and associated vegetational changes. There were undoubtedly extensive forest links across much of East Africa, in fact very large acreages have only very recently been destroyed by man. Some forest areas were isolated by extensions of the desert areas quite early on. The true Somali desert area is an ancient wedge which I feel must date back to probably before the Miocene and at least well before the Tertiary volcanic activity and, in fact, is part of desert conditions which may formerly have extended at a pre-Miocene date (?) from Sind to South West Africa. This wedge may not have been uniformly continuous and has now been obscured by vegetational changes in Central Africa. The flora of this dry belt is impressively characteristic, particularly that area which extends from the Ogaden and Somaliland through Eastern Kenya to the Pare Mountains in Tanganyika. The idea of a continuous dry link between Sind and South West Africa is not easy to envisage since at an early enough date there was no link with India to the north east and the flora of the fire-swept savannah in Rhodesia, with its curious subshrubby pyrophytes in otherwise large, woody genera, and its endemic annuals is undoubtedly very old. It is unlikely that any of these floras was formed suddenly. All may be old but their extent and thus possibilities as barrier formers did vary enormously. A constant struggle between evergreen forest areas and desert and savannah areas must have occurred during alternating dry and wet periods, both before and after the

Tertiary upheavals, the relative areas shrinking and enlarging, with bridges linking similar areas being destroyed and restored. This dry Somali wedge separates M. wahlbergi, M. zanzibarica and, to a certain extent, M. hildebrandti elevata from other taxa of Maizania. If this dry area is as old as I believe, the coastal forest vegetation may have gained many of its components from the west via loops through southern Tanganyika. There are certainly floristic components that extend from Chirinda in Southern Rhodesia up the Tanganyika coast to Kenya, and others of western origin which are quite alien to the evergreen forest in the centre of Kenya.

M. wahlbergi, M. zanzibarica, M. volkensi, M. marsabitensis and most M. elatior have close striae but M. elatior shows considerable variation in this respect and wide costae are present in material, particularly from eastern localities. In fact M. elatior from Kenya and Kungwe closely resemble M. hildebrandti kibonotoensis, but some Kungwe material almost equally resembles M. wahlbergi. There is little doubt that each isolated locality has a population that is slightly different, but for practical purposes it is not reasonable to give them all names. Without more fossil evidence it is not possible to even guess at a phylogenetic arrangement. Despite the occurrence of large species with wide costae in Miocene beds (assuming that these are correctly dated) it is difficult to look on the closely striated species as newer, rather, I believe, they are older. Species similar to M. volkensi and M. wahlbergi were already evolved at the beginning of the Miocene and widespread through much of the forest according to their ecological requirements. Present M. wahlbergi and its ally M. zanzibarica are the product of long isolation from parent stock, as presumably are the strongly ribbed species of West Africa. M. elatior may well be close to the original type and it still appears to be very plastic. Larger species (wahlbergi, hildebrandti hildebrandti, hildebrandti elevata, and presumably the Miocene species) live in rather hotter places and may have been forced into the eastern areas during colder periods. That M. hildebrandti evolved before the volcanic upheavals seems evident from its occurrence in the East Usambaras and the Ulugurus as a large elevated race. The races of hildebrandti on volcanic ground have been modified by the severe climatic and tectonic changes from a previously widely distributed larger form. M. volkensi which has survived through much of the area may well be the result of an adaptation to colder climates but is still capable of living in some hotter, lower areas. A possibility with much evidence in its favour is a cold spell that extended alpine conditions in fairly old elevated areas. The Aberdares, Cherangani Hills and Ethiopian Highlands have all had alpine conditions on their summits for three to five times as long as Mount Kenya has existed. Some such area is necessary to explain the origin of the Afroalpine flora now found also on quite recently formed mountain tops which have been isolated since their origin. This peculiar Afroalpine flora is scarcely of very recent origin and non alpine relatives of the Giant Lobelias are to be found from Ethiopia and the Cameroons to the Usambaras, and even in Southern Rhodesia in forest areas. It is difficult to believe that this flora reached the individual mountains by long distance dispersal, but no other explanation seems to fit. A cold spell which put the alpine zones in contact with each other, or which did the same for hypothetical prevolcanic elevated alpine areas, would have destroyed a vast amount of the lowland flora and this did not happen. The long distance dispersal could have been helped considerably by a less violent cold spell and some of the volcanos now mere remnants (e.g. Suswa, Longonot, Crater Highlands, etc.) may have been tall enough to support afroalpines if they had quiescent periods before they erupted violently.

Explanation of Plates

Fig.

1. *M. olivacea* Bgt.
Tanganyika, Nguru Mountains, holotype

2,5. *M. hildebrandti elevata* Verdc.
Tanganyika, Uluguru Mountains, holotype (J. Bond)

3. *M. wahlbergi* (Benson)
Kenya, Vipingo (B. Verdcourt)

4. *M. hildebrandti elevata* Verdc.
Tanganyika, E. Usambaras, Amani, Mt. Bomole, cotype (B. Verdcourt)

6. *M. elatior* (von Martens)
Kenya, Nandi Forest (M. Powell)

7,10. *M. elatior* (von Martens)
Tanganyika, Buha District, Kasakela - north of Kigoma (B. Verdcourt)

8. *M. elatior* (von Martens)
Tanganyika, Kungwe, Lukandamila (D.H. Eccles)

9. *M. elatior* (von Martens)
Sudan, Didinga Mountains (G.D. Hale Carpenter)

11,19. *M. elatior* (von Martens)
Tanganyika, Kungwe, Mahari Mountains (J. Cooke)

12. M

12. *M. elatior* (von Martens)
Uganda, Toro (G.D. Hale Carpenter)

13. *M. hildebrandti hildebrandti* (von Martens)
Kenya, Kibwezi (S. Coryndon)

14. *M. elatior* (von Martens)
Congo, Tschibinda (F. Hendrickx)

15,16. *M. hildebrandti kibonotoensis* (D'Ailly)
Tanganyika, Ngurdoto Crater (L.D. Verdcourt)

17,20. *M. hildebrandti kibonotoensis* (D'Ailly)
Kenya, Mathews Range, Wamba (Opiko)

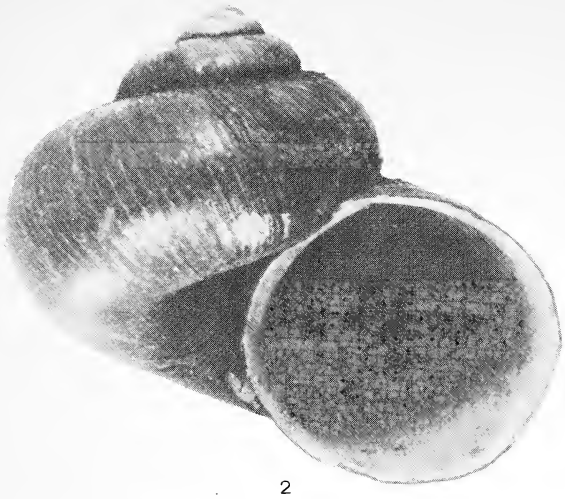
21,22. *M. hildebrandti thikensis* Verdcourt
Kenya, Thika, Chania Gorge, cotype (B. Verdcourt)

18,23. *M. hildebrandti kibonotoensis* (D'Ailly)
Kenya, Mt. Marsabit (B. Verdcourt)

24,25. *M. hildebrandti kibonotoensis* (D'Ailly)
Kenya, Mt. Kulal (B. Verdcourt)

The scale represents millimetres and refers to all figures save Fig. 1 which is x 1.50.

Fig. 1



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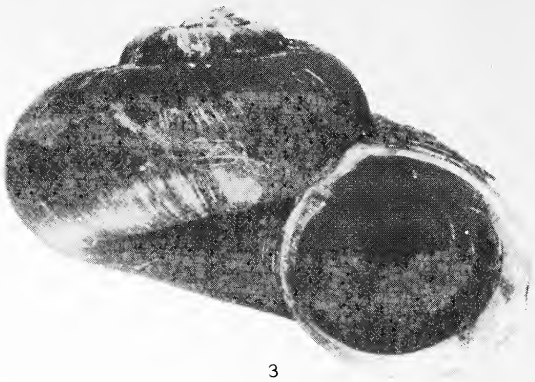

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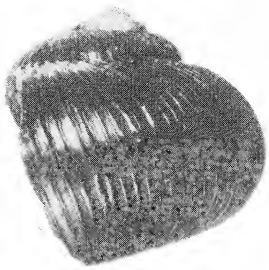

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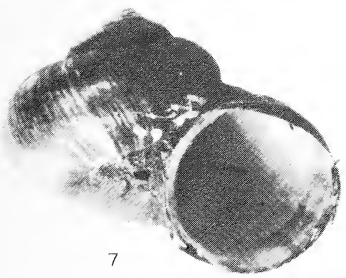

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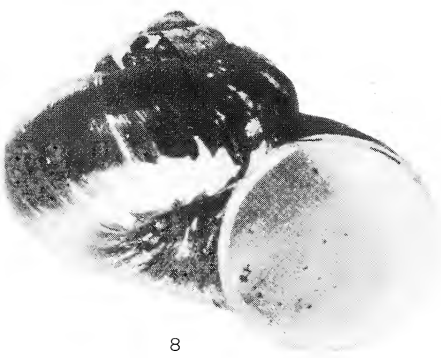

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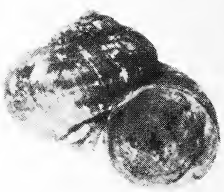

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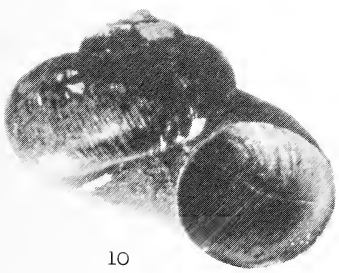

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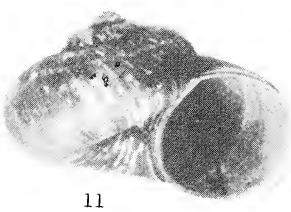

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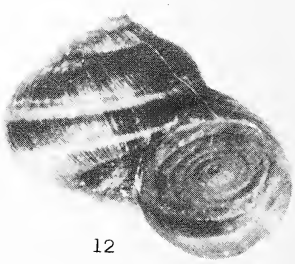

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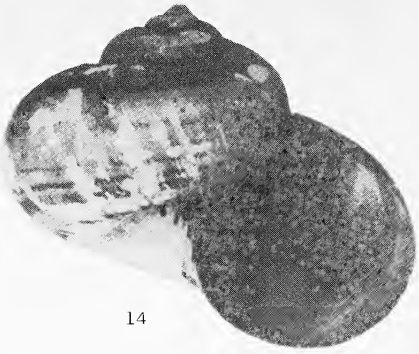

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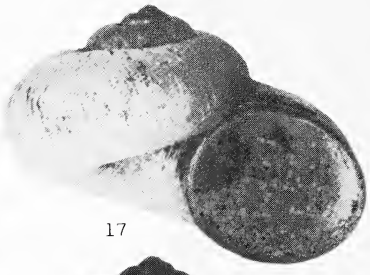

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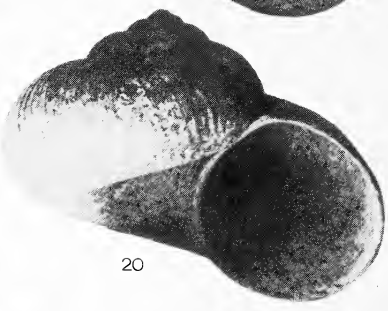

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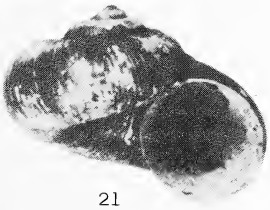

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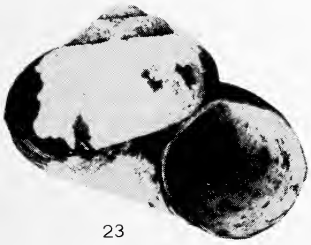

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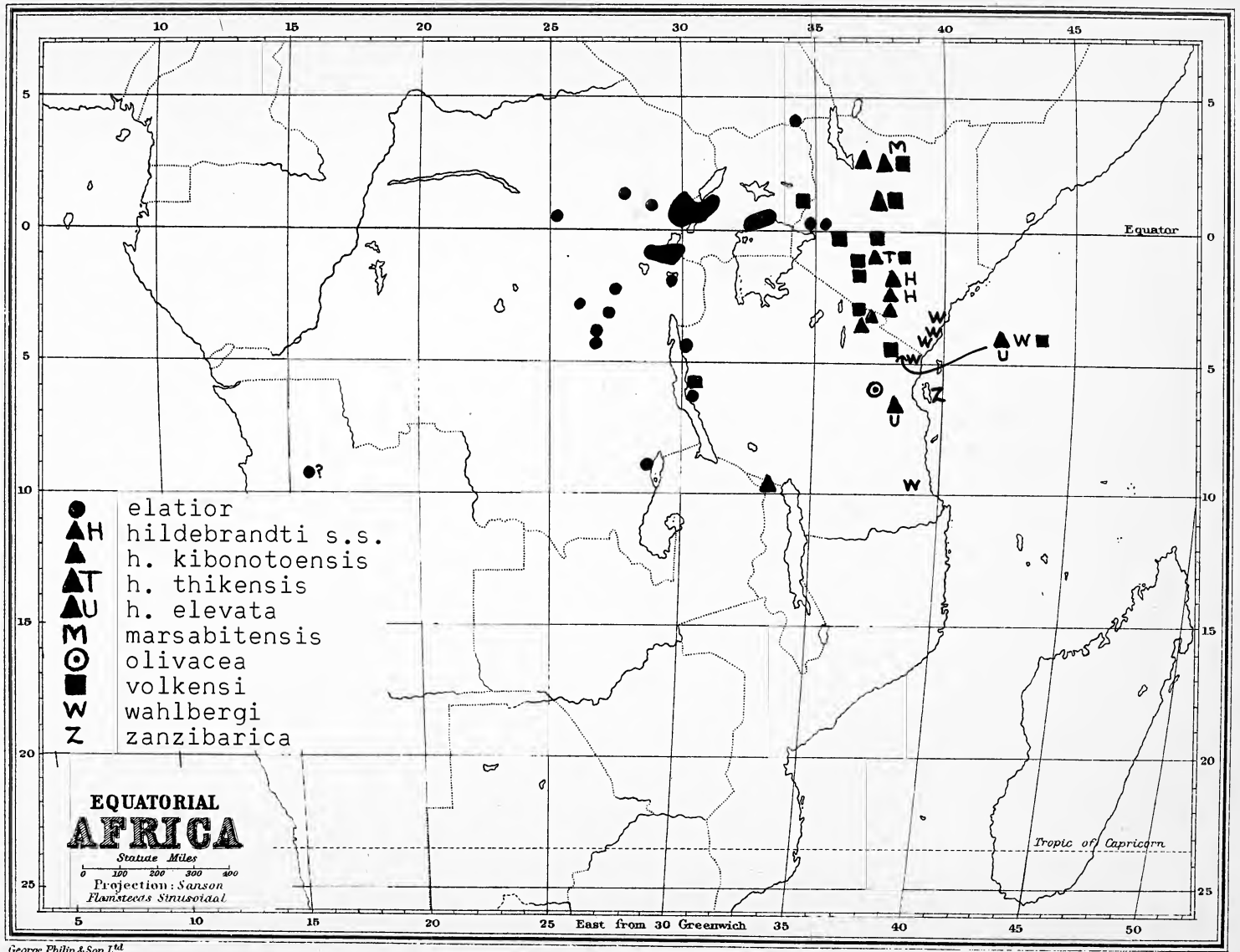
elatior
H hildebrandti s.s.
h. kibonotoensis
T h. thikensis
U h. elevata
M marsabitensis
O olivacea
volkensi
W wahlbergi
Z zanzibarica
EQUATORIAL
AFRICA
Statute Miles
0 100 200 300 400
Projection: Sanson Flamsteeds Sinusoidal
Equator
Tropic of Capricorn
East from 30 Greenwich
George Philip & Son, Ltd.
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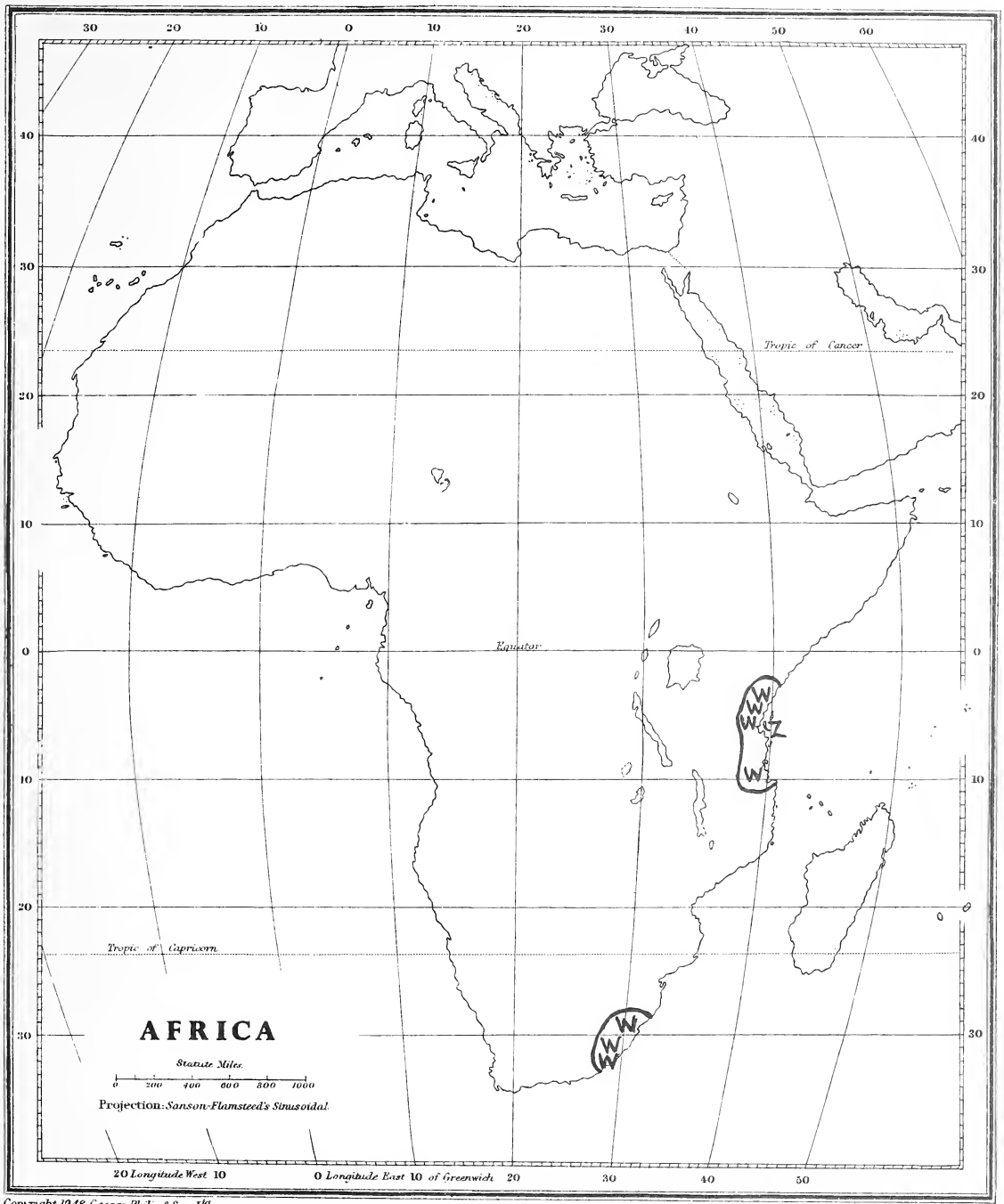
Distribution of Maizania zanzibarica and M.wahlbergi



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CYPERACEAE OF EAST AFRICA - II

By

D.M. NAPPER

SCLERIA Berg.

One of the largest genera of sedges, Scleria is distributed throughout the tropics and subtropics but does not extend into the Mediterranean region and the Near East. These leafy herbs are usually to be found in wet places, pools, marshes and streams, in open grassland or forest and are most abundant in areas of high rainfall; their altitudinal tolerance seems high, as in East Africa they are found from sea level to 8,000 or 9,000 ft.

Though all are leafy herbs, the African species of Scleria exhibit a wide range of habit, from slender annual plants only a few inches high to erect perennials sometimes as much as 15 ft. and semiscandent forest plants with stems up to 30 ft. long. The majority of the species however are erect leafy herbs ½ - 5 ft. high. The mouth of the leaf sheath on the side opposite the blade is usually truncate or slightly concave, but in a few species it is produced into a distinct tongue or pseudoligule. The spikelets may be clustered in terminal ebracteate spikelike inflorescences sparingly branched in some species (section Hypoporum), or borne in lateral and terminal panicles arising from the sheaths of the leafy bracts (sections Scleria and Ophyroscleria). In some species all the spikelets are unisexual, in others there are male and androgynous spikelets. The spikelets are composed of spirally arranged glumes of which the 2 - 4 lowest are empty with either several male or one female and several male flowers above them. The ovary of the female flowers has a three-branched non-persistent style and develops into an ovoid, ellipsoid or subglobose nutlet with a smooth and shining or variously reticulated, tuberculate or otherwise sculptured surface, sometimes bearing minute hairs. The mature gynophore, which is inconspicuous in section Hypoporum (species 21 - 44), is dilated at the apex into a trilobed or cuplike hypogynous disc with smooth margins in the section Scleria (species 4 - 20), with ciliate margins in Ophyroscleria (species 1 & 2) and reflexed in Acriulus (species 3).

The little known species S. greigiifolia has for many years been treated as a separate genus, Acriulus, and is so given in my Key to Genera (this journal, vol. 24, no.2,3),but recently published studies (Kern 1964) have demonstrated that there are insufficient grounds for keeping it so. I have therefore included it in Scleria, as was done by Clarke in the Flora of Tropical Africa.

Key to Species

1. Inflorescence of terminal and axillary panicles; bracts leafy (excepting S. poaeformis) 2
   Inflorescence terminal only, an interrupted spike, sometimes sparingly branched; bracts not leafy (excepting S. lithosperma) 23

2. Margin of the hypogynous disc ciliate 3
Margin of the hypogynous disc, where present, entire..... 4

3. Nutlets smooth ..... 1. S. racemosa
Nutlets warted ..... 2. S. verrucosa

4. Plants perennial with a well-developed rhizome..... 5
Plants mostly annual, rhizome absent or scarcely developed 17

5. Leaves 7 - 40 mm. wide; panicle solitary without foliaceous bracts ..... 4. S. poaeformis
Leaves 1 - 16 mm. wide; panicles 2 - 5, the lateral ones having leafy subtending bracts..... 6

6. Stems up to 30 ft. long, scrambling over bushes and trees ..... 7. S. barteri
Stems not usually over 6 ft. high, erect 7

7. Female glumes 7 - 11 mm. long; nutlets 4 - 6 mm. long ..... 5. S. melanomphala
Female glumes 2.5 - 8 mm. long; nutlets 1 - 4 mm. long 8

8. Panicles pendulous, much branched; spikelets numerous, broadly oblong, obtuse, 4 - 5 mm. long ..... 3. S. greigiifolia
Panicles sparingly branched, erect or pendulous; spikelets fewer, acute, rarely less than 6 mm. long 9

9. Mature nutlets bluish, at least at the apex 10
Mature nutlets not bluish, white or coloured 11

10. Tip of the female glumes recurved; nutlets up to 2.5 mm. long, hairy (use hand lens)..... 6. S. pterota
Tip of the female glumes not recurved; nutlets 2.5 - 4 mm. long, glabrous..... 8. S. iostephana

11. Nutlets hairy, at least at the base (use hand lens) 14
Nutlets glabrous 12

12. Leaves 1 - 3 mm. wide; nutlets warted, less than 2.5 mm. long ..... 10. S. laxiflora
Leaves 2 - 10 mm. wide; nutlets smooth, 2.5 - 4 mm. long 13

13. Leaves 3 - 4 mm. wide, soft and glabrous.... 22. S. lithosperma
Leaves up to 7 mm. wide; hairy beneath .... 9. S. pachyrrhyncha

14. Female glumes 4 - 5 mm. long; nutlets 3 - 4 mm. long 15
Female glumes 5 - 7 mm. long; nutlets 2 - 3 mm. long 16

15. Leaves glabrous; stems up to 6 ft. high .... 13. S. canaliculato-triquetra
Leaves hairy; stems not over 3 ft. high...14. S. adpresso-hirta

16. Lateral peduncles very long and slender, the panicles pendulous, 3 - 5 at each node... 11. S. nyasensis
Lateral peduncles shorter and stout, the panicles erect, scarcely exserted from the sheaths, solitary ..... 12. S. achtenii

17. Lateral panicles 2 or more arising from at least one of the nodes 18
Lateral panicles all solitary at the nodes 19

18. Lateral peduncles erect; nutlets lightly pitted ..... 15. S. hildebrandtii
Lateral peduncles pendulous; nutlets smooth.... 16. S. gracillima

19. Nutlets completely smooth ..... 17. S. schimperiana
Nutlets not entirely smooth 20

20. Lateral panicles borne on erect peduncles.....21
Lateral panicles borne on pendulous peduncles 22

21. Nutlets ovoid, warted, smoother towards the tip... 18. S. foliosa
Nutlets ellipsoid or cylindric, evenly pitted all over ..... 19. S. tessellata

22. Nutlets ovate to subglobose, hairy or glabrous, 2 - 3 mm. long ..... 20. S. bambariensis
Nutlets globose, over 3 mm. long, hairy (use hand lens) ..... 21. S. globonux

23. Perennials with a more or less elongated rhizome 24
Fibrous rooted annuals without rhizomes 38

24. Inflorescence partially lateral, with leafy bracts ..... 22. S. lithosperma
Inflorescence wholly terminal, no leafy bracts present 25

25. Stems bulbous at the base ..... 37. S. bulbifera
Stems not bulbous 26

26. Glomerules reflexed 27
Glomerules not reflexed 28

27. Lower leaves very much shortened ..... 41. S. nutans
Lower leaves usually over 6 in. long ..... 42. S. catophylla

28. Mouth of leaf sheaths with 'ligules' 29
Mouth of leaf sheath truncate or concave, without a 'ligule' 32

29. Inflorescence unbranched; female glumes villous; awns 2 - 4 mm. long ..... 35. S. erythrorrhiza
Inflorescence sparingly branched; female glumes glabrous or almost so; awns absent or less than 2 mm. long 30

30. Spikelets 4 - 5 mm. long; glumes reddish brown to blackish ..... 26. S. rehmannii
Spikelets 5 - 10 mm. long; glumes greenish or chestnut 31

31. Spikelets 5 - 8 mm. long; glumes dark chestnut chestnut ..... 25. S. welwitschii
Spikelets 8 - 9 mm. long; glumes pale brown ..... 34. S. longispiculata

32. Inflorescence a simple spike, but sometimes with a solitary branch from a lower glomerule bearing a single glomerule.....33
Inflorescence more copiously branched 34

33. Female glumes chestnut ..... 36. S. flexuosa
Female glumes blackish red ..... 33. S. dregeana

34. Female glumes up to 2 mm. long ..... 23. S. poaeoides
Female glumes over 2.5 mm. long 35

35. Inflorescence 2 - 9 ins. long; nutlets smooth and 1.5 - 2 mm. long, or patterned 36
Inflorescence very scanty; nutlets only 1 mm. long, smooth ..... 28. S. paupercula

36. Leaves sparingly hairy, 0.5 - 1.5 mm. wide; female glumes finely hispid ..... 29. S. richardsiae
Leaves glabrous, 1.5 - 3.5 mm. wide; female glumes glabrous 37

37. Inflorescence 3 - 9 ins. long, spreading; female glumes not over 3 mm. long; nutlets usually strongly warted or transversely ridged ..... 27. S. woodii var. woodii
Inflorescence 1½ - 4 ins. long, somewhat contracted; female glumes 3 - 4 mm. long; nutlets smooth or faintly transversely ridged ..... 27. S. woodii var. ornata

38. Glomerules reflexed 39
Glomerules not reflexed 40

39. Glomerules solitary, sessile ..... 44. S. melanotricha
Glomerules mostly paired, shortly and distinctly pedunculate ..... 43. S. grata

40. Female glumes hairy, at least on the midrib and awn 41
Female glumes glabrous 45

41. Plants rather densely hairy; female glumes hairy all over ..... 40. S. hispidior
Plants sparsely hairy; female glumes glabrous except on the midrib and awn 42

42. Glomerules 3 - 4; spikelets 4 - 6 mm. long... 39. S. glomerulata
Glomerules 4 - 15; spikelets 3 - 4 mm. long 43

43. Awn of the bracteole with reddish bristles.....38. S. hispidula
Awn of the bracteole whitish ciliate above 44

44. Leaves up to 1 mm. wide; glumes green or pale brown ..... 30. S. delicatula
Leaves over 1 mm. wide; glumes blackish red.....31. S. pulchella

45. Plant completely glabrous; panicle compound ..... 24. S. glabra
Plant usually hairy on the leaf sheaths; inflorescence spikelike, or sparingly branched at the base 46

46. Spikelets 2 - 4 mm. long; plants up to 6 ins. high ..... 31. S. pulchella
Spikelets 4 - 5 mm. long; plants ½ - 3 ft. high ..... 32. S. pergracilis var. brachystachys

1. S. racemosa Poir. (Fig. 7)
Stout broad-leaved perennial 3 - 13 ft. high. Panicles fairly dense, long exserted from the leafy bracts. Female glumes 4 - 5 mm. long. Nutlets smooth, glabrous and conspicuously beaked. Swamp forest and shady places in swamps; sea level - 4,000 ft.
KENYA - Shimba Hills.
TANGANYIKA - Lake Tanganyika, Usambara Mts., Morogoro, Dar es Salaam, Mafia Island, Ulanga, Lindi.
UGANDA - Entebbe, Kigezi.
ZANZIBAR - Zanzibar Island, Pemba Island.

2. S. verrucosa Willd.
Robust perennial 3 - 16 ft. high with broad scabrid-margined leaves. Panicles rather dense. Female glumes 4 - 6 mm. long, with ciliate margins. Nutlets more or less warted below with reddish bristles on the warts and smooth at the tip, conspicuously beaked. Rain and swamp forest, always in water; 3,500 - 4,000 ft.
TANGANYIKA - Bukoba.
UGANDA - Sese Islands, Entebbe.

3. S. greigiifolia (Ridl.) C. B. Cl. (Figs. 6, 8)
(Acriulus madagascariensis Ridl., Scleria acriulus C. B. Cl.)
Densely tufted perennial forming clumps 3 - 5 ft. high; leaves with coarsely serrate margins and scabrid-angled sheaths. Panicles long-exserted and pendulous with brown spikelets. In seasonally swampy grassland and beside streams; 3,000 - 4,000 ft.
TANGANYIKA - Bukoba, Songea.
UGANDA - Masaka.

4. S. poaeformis Retz.
(S. oryzoides Presl)
Stout perennial 4 - 7 ft. high with scabrid-margined leaves. Panicles terminal without conspicuous bracts. Female glumes 3.5 - 5 mm. long. Nutlets smooth and glabrous. In shallow water; sea level - 100 ft.
TANGANYIKA - Dar es Salaam, Mafia Island.
ZANZIBAR - Pemba Island.

5. S. melanomphala Kunth
Stout perennial 1½ - 6 ft. high with broad scabrid-margined ligulate leaves. Panicles dense, the lateral ones pendulous. Female glumes 7 - 9 mm. long, black and green. Nutlets smooth or faintly warted. Swamps, marshes, boggy grassland and streams; 1,500 - 6,000 ft.
KENYA - Nyanza, Meru.
TANGANYIKA - Lake and Western Regions, Southern Highlands. Ulanga, Songea.
UGANDA - W. Nile, Kampala, Entebbe, Mubende, Buddu.

6. S. pterota Presl
Robust perennial 1 - 4 ft. high with scabrid-margined ligulate leaves. Panicles solitary, scarcely exserted. Female glumes dark red, 3.5 - 5 mm. long. Nutlets smooth, usually with tufts of hairs below. Damp wooded places; sea level - 2,500 ft.
TANGANYIKA - Moshi, Ulanga.
ZANZIBAR - Pemba Island.

7. S. barteri Boeck. (Fig. 10)
Perennial climber with scabrid-margined leaves. Panicles solitary, rather loose. Female glumes 5 - 6 mm. long. Nutlets lilac, minutely hairy, 3 - 3.5 mm. long. Rain forest and damp shady places, sea level - 4,000 ft.
UGANDA - Sese Islands, Entebbe.
ZANZIBAR - Pemba Island.

8. S. iostephana Nelmes
Stout perennial 2 - 7 ft. high with scabrid-margined often ligulate leaves. Panicles solitary. Female glumes dark red, glabrous or hairy, 4 - 5.5 mm. long. Nutlets smooth, blue-black above and violet below. Swamp forests and dense evergreen woodland; 3,000 - 4,000 ft.
TANGANYIKA - Bukoba, Sumbawanga, Ulanga.
UGANDA - Sese Islands, Masaka, Entebbe.

9. S. pachyrhyncha Nelmes
Robust perennial up to 3½ ft. high with ligulate leaves. Panicles solitary, scarcely exserted. Female glumes green or brown, 4 - 5 mm. long. Nutlets 3 - 4 mm. long, smooth and glabrous. Forests; 5,500 ft.
TANGANYIKA - Uluguru Mts.

10. S. laxiflora R. Gross
Slender glabrous perennial up to 3 ft. high, often with prostrate stems. The stem-bases are thickened and packed tightly together forming a knotted mass or dense row. Panicles narrow, solitary, distant. Female glumes 4 - 5.5 mm. long. Nutlets almost completely smooth. Vegetatively very similar to S. bequaertii, which has a sparingly branched rhizome 3 - 4 mm. thick, of which I have yet to see any East African material. Swampy grassland; 3,000 - 5,500 ft.
TANGANYIKA - Songea.

11. S. nyasensis C.B.Cl.
Slender perennial 1½ - 3 ft. high with ligulate leaves. Panicles few, the lateral ones several at each node, pendulous on long slender peduncles. Female glumes green, 5 - 7 mm. long. Nutlets faintly pitted with tufts of hairs along the ridges. Swamps and stream sides; 4,000 - 6,500 ft.
TANGANYIKA - Bukoba, Sumbawanga, Southern Highlands, Songea.
UGANDA - Entebbe, Kampala, Kipayo, Kingwe.

12. S. achtenii De Wild.
(S. nyasensis auctt. pro parte)
Perennial very similar to S. nyasensis, but easily distinguished by the solitary shorter stout peduncles of the lateral panicles. Peaty bogs and swamps; sea level - 4,000 ft.
TANGANYIKA - Bukoba, Mafia Island.

13. S. canaliculato-triquetra Boeck.
Robust rhizomatous perennial up to 6 ft. high. Panicles few, the lateral ones on long peduncles solitary or paired. Female glumes glabrous, dark red, 4 - 5 mm. long. Nutlets 3 - 4 mm. long, smooth or faintly pitted. Valley woodland and riverine grassland; 2,500 - 3,500 ft.
TANGANYIKA - Kigoma, Usambara and Uluguru Mts., Songea.
UGANDA - Mugamba.
ZANZIBAR - Pemba Island.

14. S. adpresso-hirta (Kukenth.) E.A. Robinson
(S. canaliculato-triquetra var. adpresso-hirta Kukenth.)
Perennial up to 3 ft. high with the upper part of the stems and the leaves hairy. Panicles several, the lateral ones solitary or paired. Swamps and seasonally swampy grassland; 3,000 - 4,500 ft.
TANGANYIKA - Ujiji.

15. S. hildebrandtii Boeck.
Loosely tufted annual 1 - 2 ft. high. The lateral panicles on stout erect peduncles, paired or solitary. Female glumes 5 - 6 mm. long, pale or reddish. Nutlets somewhat transversely wrinkled or almost smooth.
KENYA - Mombasa.
TANGANYIKA - Usambara Mts.

16. S. gracillima Boeck.
Slender annual up to over 1 ft. high with narrowly linear leaves. Panicles small and delicate, pendulous on long slender peduncles. Female glumes 4 - 4.5 mm. long. Nutlets smooth and glabrous. Marshy grassland and seasonally boggy ground; 3,000 ft.
TANGANYIKA - Songea.

17. S. schimperiana Boeck.
Loosely tufted annual ½ - 2½ ft. high and very similar to S. foliosa. Panicles few, the lateral ones solitary, pendulous, on slender hairy peduncles. Female glumes 5 - 7 mm. long dark brownish-red. Nutlets smooth and glabrous. Swamps and seasonally flooded grassland; 2,500 - 3,500 ft.
TANGANYIKA - Songea.
UGANDA - Eastern Acholi.

18. S. foliosa A. Rich.
Annual ½ - 5 ft. high, with numerous shortly ligulate subglabrous leaves. Panicles few, the lateral ones solitary and shortly exserted on stout peduncles. Female glumes 3 - 5 mm. long, green to blackish-red. Nutlets glabrous, warted. Depauperate plants are easily confused with S. bambariensis. In standing water, marshes and seasonally swampy grassland; sea level - 5,500 ft.
KENYA - Nairobi, Fort Hall.
TANGANYIKA - Bukoba, Shinyanga, Tabora, Arusha, Usambara Mts., Tanga, Ulanga District.
UGANDA - Bunyoro, Teso.
ZANZIBAR - Zanzibar Island.

19. S. tessellata Willd.
Densely tufted annual up to 3 ft. high. Panicles few, the lateral ones on short stout peduncles, solitary. Female glumes 5 - 7 mm. long, glabrous, pale. Nutlets glabrous, faintly pitted. Wet grassland and swamps; 3,000 - 4,000 ft.
TANGANYIKA - Songea.

20. S. bambariensis Cherm.
(S. parvula auctt.)
An erect densely tufted and usually hairy annual ½ - 3 ft. high. Panicles few, the lateral ones solitary on long slender peduncles. Female glumes 4 - 5 mm. long, yellowish green or scarious, Nutlets pitted. A very variable species. Swampy places and seasonally wet grassland; 400 - 4,000 ft.
KENYA - Mombasa, Kwale.
TANGANYIKA - Tanga, Handeni, Sumbawanga, Songea.

21. S. globonux C.B.Cl. (Figs. 1,5)
Sparingly hairy perennial 1½ - 3 ft. high, very similar to the above, but with the lateral panicles solitary and pendulous on very long, more or less villous, peduncles. Female glumes 5 - 6 mm. long. Nutlets pitted, with minute hairs on the ridges. Swamps and marshy ground; 3,000 - 4,000 ft.
UGANDA - Soroti.

22. S. lithosperma (L.) Schwartz
(S. puzzolanea K. Schum.)
Tall slender rather hairy perennial 1 - 3 ft. high. Panicles several, leafy, with green or brownish spikelets 4 - 5 mm. long in clusters of 1 - 3. Nutlets smooth and pearly, shortly beaked. Damp places in forest and evergreen thicket; sea level - 2,000 ft.
KENYA - Rabai Hills, Kwale.
TANGANYIKA - Usambara Mts., Tanga, Uzaramo and Ulanga Districts.
ZANZIBAR - Pemba Island.

23. S. poaeoides Ridl.
Slender glabrous perennial ½ - 2½ ft. high. Inflorescence of solitary or clustered spikelets, branched from the lower clusters. Spikelets 3.5 - 5 mm. long, dark red. Nutlets small, up to 1.5 mm. long, tuberculate. Marshy grassland and swamps; 3,000 - 6,000 ft.
KENYA - Bungoma.
TANGANYIKA - Buha, Southern Highlands, Songea.

24. S. glabra Boeck.
Glabrous annual 2 - 4 ft. high. Inflorescence paniculate, often twice branched from the lower clusters of spikelets. Spikelets blackish, 3.5 - 5 mm. long. Nutlets small, shallowly pitted or somewhat transversely wrinkled. Seasonally swampy grassland and seepage zones on rocky outcrops; 3,000 - 6,500 ft.
TANGANYIKA - Southern Highlands, Songea.

25. S. welwitschii C.B.Cl.
Slender perennial 1 - 3½ ft. high, with glabrous or hairy ligulate leaves. Inflorescence sparingly branched with clusters of 5 - 7 mm. long spikelets. Female glumes 3 - 4 mm. long, dark chestnut. Nutlets smooth. Vlei, swamp or seasonally wet grassland; 8,000 ft.
TANGANYIKA - Mbeya Mts.

26. S. rehmannii C.B.Cl. (Fig. 11)
Slender perennial 1 - 5 ft. high with more or less hairy ligulate leaves. Inflorescence with simple branches arising from the lower clusters of dark red 4 - 5 mm. long spikelets. Nutlets smooth or warted in transverse lines. Damp places and seasonally flooded grassland; 1,500 - 3,500 ft.
TANGANYIKA - Southern Region.

27. S. woodii C.B.Cl. var. woodii
Slender glabrous perennial 1 - 3 ft. high. Inflorescence with several simple branches from the lower clusters of greenish, 4 - 5 mm. long spikelets. Nutlets up to 2 mm. long, pale, strongly warted or transversely ridged. Damp and swampy places in grassland and seasonal swamps; 3,000 - 4,500 ft.
TANGANYIKA - Tabora, Southern Highlands.

var. ornata (Cherm.) Schultze-Motel
(S. rehmannii var. ornata Cherm., S. striatonux De Wild.)
Very similar to the above but differing in the more compact, smaller inflorescence and the almost smooth nutlets. Damp and swampy places in grassland; 3,000 - 4,500 ft.
KENYA - Mt. Elgon.
TANGANYIKA - Usambara Mts., Tabora - Kigoma, Ulanga District, Southern Highlands.
UGANDA - West Nile, Busoga, Bugoye, Kampala.

28. S. paupercula E.A. Robinson (in press)
Slender erect glabrous perennial ½ - 1½ ft. high. Inflorescence very small, of 2 - 6 clusters of spikelets, simple or with a solitary branch at the base. Spikelets glabrous, dark red, 3 - 4 mm. long. Nutlets small, smooth. Permanently marshy places; 4,500 - 5,000 ft.
TANGANYIKA - Songea.

29. S. richardsiae E.A. Robinson
Slender weak-stemmed perennial up to 4 ft. high with sparingly hairy often ligulate leaves. Inflorescence with simple branching from the lower clusters of dark red 3.5 - 5 mm. long spikelets. Nutlets glabrous, transversely wrinkled. Streams and boggy places; 6,000 - 7,000 ft.
TANGANYIKA - Sumbawanga, Southern Highlands.

30. S. delicatula Nelmes
(Including S. spondylogona Nelmes)
Slender glabrous annual up to 1½ ft. high. Inflorescence unbranched, of clusters of pale or reddish-brown spikelets 3 - 5 mm. long. Nutlets brownish, finely transversely wrinkled. In pools and seepage zones on rocky outcrops; 3,000 - 4,500 ft.
TANGANYIKA - Tabora - Kigoma.

31. S. pulchella Ridley
Citrus-scented slender annual up to 6 ins. high. Inflorescence simple or with short branches from the lowest clusters of glabrous dark red, 2 - 4 mm. long spikelets. Nutlets small, faintly transversely ridged or pitted. Seasonally swampy places and seepage zones; 5,000 - 7,000 ft.
TANGANYIKA - Sumbawanga, Southern Highlands.

32. S. pergracilis (Nees) Kunth var. brachystachys Nelmes
Slender glabrous annual ½ - 2 ft. high. Inflorescence simple with numerous clusters of dark red spikelets 4 - 5 mm. long. Nutlets glabrous, with shallow pits in transverse rows. Wet grasslands and seasonal swamps; 2,500 - 5,000 ft.
TANGANYIKA - Songea, Southern Highlands.

33. S. dregeana Kunth
Slender perennial up to 3½ ft. high. Inflorescence simple, with close-set clusters of blackish, 4.5 - 6 mm. long spikelets. Nutlets smooth or papillose. Swampy grassland and near streams; 3,000 - 6,000 ft.
TANGANYIKA - Songea, Southern Highlands.

34. S. longispiculata Nelmes
Stout rhizomatous perennial up to 4 ft. high. Inflorescence sparing branched with clusters of greenish or pale brown minutely hispidulous 8 - 9 mm. long spikelets. Nutlets 3.5 - 4 mm. long, smooth. Brachystegia woodlands; 2,500 - 4,000 ft.
TANGANYIKA - Songea.

35. S. erythrorrhiza Ridley
Rhizomatous perennial up to 2½ ft. high with ligulate, glabrous or hairy leaves. Inflorescence simple with numerous clusters of dark 5 - 6 mm. long spikelets, whitish ciliolate above. Nutlets smooth. Seasonally swampy grasslands and permanent swamps; 3,000 - 6,000 ft.
TANGANYIKA - Songea, Southern Highlands.

36. S. flexuosa Boeck.
Slender hairy perennial up to 2½ ft. high with a very slender rhizome. Inflorescence simple with clusters of 4.5 - 6 mm. long spikelets, the female glumes sparingly hairy. Nutlets glabrous, with interrupted transverse ridging. Seasonally swampy grassland; 3,000 - 6,000 ft.
TANGANYIKA - Songea, Southern Highlands.

37. S. bulbifera A. Rich. (Figs 2,4)
S. schweinfurthiana Boeck., S. schliebenii R. Gross)
Rhizomatous perennial up to 3 ft. high, with swollen bulbous-based stems. Inflorescence simple with clusters of 4 - 6.5 mm. long dark reddish spikelets. Nutlets glabrous, smooth or faintly pitted. Seasonally damp places, vlei, rocky wooded hillsides; 3,500 - 8,000 ft.
KENYA - Kitale.
TANGANYIKA - Lake and Western Regions, Usambara Mts., Morogoro, Mpwapwa, Southern Highlands, Southern Region.
UGANDA - West Nile, Ruwenzori Mts., Lango, Karamoja.

38. S. hispidula A. Rich.
Slender glabrous or hairy perennial ½ - 1½ ft. high. Inflorescence simple, of clusters of blackish 3 - 4 mm. long spikelets with white or red cilia. Nutlets glabrous, tessellate. Damp vlei and swampy places; 3,500 - 5,500 ft.
TANGANYIKA - Singida and Moshi Districts, Southern Highlands.

39. S. glomerulata Oliv.
Slender sparingly hairy annual up to 9 ins. tall. Inflorescence of few clusters of pale or reddish ciliate 4 - 6 mm. long spikelets. Nutlets faintly, transversely pitted. Seasonally wet places among rocks.
UGANDA - Madi.

40. S hispidior (C.B.Cl.) Nelmes
(S. hispidula var. hispidior C.B.Cl.)
Slender hairy annual with tufted stems up to 1 ft. high. Inflorescence of few erect clusters of dark 3 - 6 mm. long spikelets with blackish cilia. Nutlets reddish, faintly transversely wrinkled.

Swampy grassland; 6,000 - 8,000 ft.
UGANDA - Mt. Elgon.

41. S. nutans Kunth
(S. hirtella auctt. non Swartz)
Perennial ½ - 4 ft. high with solitary stems arising from the rhizome with the lower leaves very reduced, and the upper ones well developed. Inflorescence simple of numerous reflexed clusters of dark 4 - 6 mm. long spikelets with long white or black cilia. Nutlets smooth. Swampy and seasonally flooded grassland; 3,500 - 7,500 ft.
KENYA - Kisii, Lolgorien Swamp.
TANGANYIKA - Bukoba, Kilimanjaro, Usambara Mts., Kigoma, Southern Highlands, Songea.
UGANDA - Sese Islands.

42. S. catophylla C.B.Cl. (Fig. 3)
Perennial up to 4 ft. high with glabrous or hairy stems and leaves. Very similar to S. nutans excepting that all the basal leaves are well developed. Inflorescence of numerous reflexed clusters of dark, ciliate, 4 - 6 mm. long spikelets. Nutlets smooth. Swampy grasslands and permanent swamps; 3,000 - 4,000 ft.
TANGANYIKA - Songea.

43. S. grata Nelmes
Slender usually hairy annual 4 - 10 ins. high. Inflorescence simple of a few reflexed clusters of dark ciliate, 3 - 4 mm. long spikelets. Nutlets tuberculate in transverse ridges, glabrous. On rocky summits above mist forest; 4,000 ft.
TANGANYIKA - Ulanga District.

44. S. melanotricha A. Rich.
Slender hairy annual ½ - 1½ ft. high. Inflorescence simple, with numerous reflexed clusters of dark ciliate spikelets. Nutlets glabrous, transversely wrinkled. Damp places in grassland and seepage zones on rocky outcrops; 2,500 - 5,000 ft.
TANGANYIKA - Western Region, Ulanga.

DIPLACRUM R.Br.

Of the eight species of Diplacrum which for the most part occur in the tropical and subtropical regions of the Old World, only one is found in East Africa.

All the species are small leafy annual herbs bearing sessile axillary fascicles or clusters of small unisexual spikes, which serve to distinguish them from Scleria with its large unisexual spikes in pedunculate inflorescences. In the female spikes the fertile flower is terminal, a condition rarely occurring in Scleria though the male rudiments above the female flowers may be so small as to be overlooked.

D. africanum C.B.Cl. (Fig. 9)
Slender leafy annual 1 - 6 ins. high with unbranched stems. Spikelets lanceolate, green or yellowish, scarcely over 1 mm. long. Nutlets white, subglobose, longitudinally striate. Seasonally swampy places and shallow soil over lateritic outcrops; 3,000 - 4,000 ft.
TANGANYIKA - Songea, N.W.Tanganyika without locality.
UGANDA - Madi.

COLEOCHLOA Gilly

Coleochloa (Eriospora A. Rich. non Berkeley & Broome) is a small genus of fewer than ten species which occur in tropical and southern Africa. The four species so far recorded from East Africa usually occur on rock pavements, cliffs and among boulders at altitudes between 4,000 and 9,000 ft.

The East African representatives of the genus are densely tufted narrow-leaved perennials with slender stems bearing branched inflorescences with dense pedunculate or sessile clusters of dense spikes composed of several - many male and bisexual spikelets. The spikelets are composed of 4 - 5 distichous glumes of which the two lowest are empty, the 2 - 3 upper either subtend male flowers only, or 1 - 2 female and 1 - 2 male flowers. The female flowers are surrounded by a sac-like utricle from which the 3 stigmas are only just exserted. The numerous hypogynous hairs are unicellular and simple, or multicellular and simple or branched.

Key to Species

1. Stems 3 - 10 mm. broad, glabrous, loosely tufted; leaves flat or folded, narrow, glabrous except for the upper surface of the midrib 2
   Stems 1 - 3 mm. broad, glabrous or villous, densely tufted; leaves convolute, very narrow, glabrous or hairy 3

2. Spikes 5 - 9 mm. long; utricles 4.25 - 6 mm. long ..... 1. C. abyssinica var. castanea
   Spikes 3 - 6 mm. long; utricles 3 - 4 mm. long ..... 2. C. microcephala

3. Spikes pedicelled, panicle open; lower surface of leaves and stems more or less hairy or villous ..... 3. C. setifera
   Spikes sessile, panicles dense; lower surface of leaves and stems glabrous ..... 4. C. virgata

1. C. abyssinica (A. Rich.) Gilly var. castanea (C.B.Cl.) Pichi-Serm. (Fig. 24)
   (Eriospora abyssinica A. Rich. var. castanea C.B.Cl.)
   Tufted perennial 1 - 3 ft. high. Leaves flat or with inrolled margins, golden brown. Panicle lax and slender; spikelets 3 - 6 mm. long with dark reddish glumes and numerous fine simple hairs. Differs from the nominate variety, which does not occur in East Africa, in the darker glumes and the wider leaves and utricles. Rocky pavements, commonly forming clumps on wet rocks; 6,000 - 8,500 ft.
   TANGANYIKA - Usambara Mts., Ufipa Plateau.
   UGANDA - Karamoja, Imatong Mts.

2. C. microcephala Nelmes
   (Eriospora abyssinica var. brevirostrata R. Gross ex Peter)
   Tufted perennial 1 - 3 ft. high with flat or folded green leaves. Panicle lax and slender; spikelets 2.5 - 3 mm. long with mucronate reddish brown glumes and fewer stouter hairs than the above, often branched. Rocky hillocks in mist forest, on cliffs and among tall

grasses on rock faces; 4,500 - 6,000 ft.
TANGANYIKA - Ulanga District, Uluguru Mts.

3. C. setifera (Ridley) Gilly (Figs. 15,16)
(Eriospora oliveri (Boeck.) C.B.Cl., E. setifera (Ridley) C.B.Cl.)
Tufted perennial from a few inches to 3 ft. high. Panicle lax and slender; spikelets 2 - 3 mm. long with reddish-brown short mucronate glumes, glabrous or hairy. Rocky outcrops, granite slabs and pavements, often with Vellozia; 1,500 - 5,000 ft.
KENYA - Kitui District.
TANGANYIKA - Tabora District and Southern Region.

4. C. virgata (K. Schum.) Nelmes
(Eriospora virgata K. Schum.)
Tufted perennial 1 - 2 ft. high with the root-masses often forming stilts. Panicle dense and interrupted; spikelets 3.5 - 4 mm. long with dark red usually mucronate glumes. Shallow soils on rocky pavements; 6,000 - 8,000 ft.
TANGANYIKA - Mt. Meru.

HYPOLYTRUM L.C. Rich.

Hypolytrum, a genus of about fifty species, occurs throughout the tropics and, though largely represented in Africa, only two species have so far been recorded from the rain forests of East Africa, one from the region of the great lakes and the other from the eastern mountain ranges (Usambara, Uluguru Mts. etc.) from about 2,000 to 4,000 ft.

All are rhizomatous perennial herbs with relatively broad flat leaves having either quite stout leafy stems bearing a terminal corymbose panicle with leaf-like bracts, or a lateral leafless slender stem with small scarious bracts in the panicle. The spikelets are small and crowded into numerous dense ovoid to cylindric spikes which may be in sessile or shortly pedicellate clusters. The spikelet consists of a few spirally arranged glumes, the lowest is empty, the next 2 are male flowers and in the species recorded here the terminal female flower is without a glume. The style is bifid. The nutlets are biconvex, more or less wrinkled and very much alike.

Key to Species

Flowering stems leafless; bracts not longer than the panicle branches; spikes 5 - 23 mm. long.1. H. heteromorphum
Flowering stems leafy; bracts foliaceous, longer than the panicle branches; spikes 3 - 8 mm. long ..... 2. H. testui

1. H. hetermorphum Nelmes (Figs. 13,14)
(formerly confused with H. africanum Steud.)
Stout rhizomatous perennial with stems ½ - 3 ft. high and numerous flat leaves 7 - 20 mm. wide, longer than the panicles. Panicle corymbiform with numerous cylindric spikes. Damp sandy places in rain and swamp forests; 3,000 - 4,000 ft.
TANGANYIKA - Bukoba District.
UGANDA - Sese Islands, Mengo, Masaka.

2. H. testui Cherm. (Fig. 12)
(H. nemorum Spreng. in Fl. Trop. Afr.)
Stout perennial 3 - 5 ft. high with numerous flat leaves often longer than the panicles. Panicle corymbiform with numerous ellipsoid or subglobose spikes. Swamp forests and damp shady places; 2,500 - 4,000 ft.
TANGANYIKA - Usambara, Uluguru and Muhulu Mts. (Ulanga).

ASCOLEPIS Nees

Ascolepis, a small genus of annual and perennial herbs, is confined almost entirely to tropical and southern Africa, but there is one species occurring in Madagascar and South America. To date seven species have been recorded in eastern Africa where they may be found in swamps, dambos and seasonally wet hollows in grassland between 2,000 and 6,000 ft.

All are small leafy herbs rarely exceeding 2 ft. tall with white or yellow Kyllinga-like heads with long green bracts. In some species the length of the squamellae (hypogynous scales) of the outer spikelets is greatly exaggerated so that they resemble the petals of the ray florets found in many of the Compositae. In others all the squamellae are of similar length. Floral structure is complex. The head consists of a flattish receptacle bearing numerous spikelets, the glumes are small and subtend the squamellae which are completely fused along one margin and partially free on the others and more or less completely surround the ovary with its 2 - 3-fid style and the stamens.

Key to Species

1. Slender annuals up to 6 ins. high; squamellae terete with an apical opening 6
Perennials with fibrous remains of the old leaf-sheaths; squamellae laterally compressed, solid at the top, and with the opening about the middle 2

2. Glumes about half the length of the squamellae 3
Glumes only 1/6 of the length of the squamellae 5

3. Glumes linear or linear-lanceolate, acute or acuminate 4
Glumes obovate, triangular at the apex, heads sometimes lobed ..... 1. A. capensis

4. Heads whitish, sometimes pale yellow when young .... 2. A. protea
Heads golden yellow ..... 5. A. anthemiflora

5. Mature heads 4 - 5 cm. diameter when fully expanded ..... 4. A. pinguis
Mature heads 2 - 3 cm. diameter when fully expanded ..... 3. A. elata

6. Squamellae orange and green, narrowed gradually towards the tip ..... 6. A. peteri
Squamellae whitish, wedge-shaped, with an awn on one side ..... 7. A. pusilla

1. A. capensis (Kunth) Ridley (Fig. 23)
(A. braziliensis (Kunth) C.B.Cl.)
Perennial up to 2½ ft. high with narrow leaves. Heads 8 - 15 mm. diam. entire or obscurely lobed, white; squamellae 4 - 6 mm. long, broadly ovate and laterally winged with a short obtuse beak. Swamps with tall grasses and Drosera etc.; 3,500 - 6,000 ft.
KENYA - Kitale.
TANGANYIKA - Kigoma, Sumbawanga, Southern Highlands.
UGANDA - Masaka District.

2. A. protea Welw. (Figs. 20,21)
Slender perennial up to 1½ ft. high sometimes with bulbous stem-bases; leaves shorter than in most species, under half the stem length. Heads 10 - 18 mm. diam. white, rarely pale yellow, with ligulate squamellae 4 - 8 mm. long, the outer ones usually longer than the inner. Swampy grassland and damp places; 3,500 - 4,500 ft.
TANGANYIKA - Western Region.

3. A. elata Welw. (Fig. 22)
(A. protea var. bellidiflora in part)
Tufted perennial up to 1½ ft. high, similar to A. protea. Heads 2 - 3 cm. diam. white, or sometimes rather yellowish with reflexed squamellae, the outer ones narrowly linear and much longer than the inner, varying from 4 - 12 mm. long in a single head. Swamps and swampy grassland; 3,500 - 4,500 ft.
TANGANYIKA - Usinge.

4. A. pinguis C.B.Cl.
Stout tufted perennial 1 - 3 ft. high. Heads very large, white, with squamellae 10 - 20 mm. long, all more or less equal. Swamps, dambos, and damp grasslands; 2,500 - 5,000 ft.
KENYA - Bungoma.
TANGANYIKA - Kigoma, Sumbawanga, Ulanga, Southern Highlands, Tunduru.
UGANDA - Soroti.

5. A. anthemiflora Welw.
Perennial 1 - 2 ft. high, with black basal sheaths and rather swollen culm-bases. Heads 1 - 2.5 cm. diam. with golden yellow ligulate squamellae up to 8 mm. long. Rather like A. protea, but the plants are larger. Swamps, dambos, and seasonally damp grassland; 4,500 - 6,000 ft.
TANGANYIKA - Northern Rhodesia border.

6. A. peteri Kukenth. (Fig. 18)
Minute slender annual 2½ - 6 ins. high. Heads up to 8 mm. diam., yellowish green, of 3 - 5 small spikes up to 4 mm. long with squamellae narrowing towards the apex. Wet rocky outcrops in grassland, sandy hollows near saline lake shore; 3,000 - 6,500 ft.
KENYA - Elgon.
TANGANYIKA - Western Region and near Lake Manyara.

7. A. pusilla Ridley (Fig. 19)
Minute slender annual 2 - 6 ins. high. Heads 3 - 5 mm. diam., pale, with conical terete squamellae with a wide apical orifice. Seasonally swampy grassland, dambos; 3,000 - 5,000 ft.
TANGANYIKA - Sumbawanga.

CLADIUM P.Browne

Cladium is a fairly large genus widespread throughout the tropics with most of its species occurring on islands or near the sea. Only two species occur in East Africa both of which are fairly robust plants with paniculate inflorescences and clustered spikelets. The spikelets have about 8 glumes of which the lower ones are empty, the middle 1 - 3 are bisexual and the top ones empty. Hypogynous bristles are small or absent. The style is 3-branched and the trigonous nutlets are crowned by the persistent style-base.

Key to Species

Leaves scabrid-margined; spikelets small, 2 - 4 mm. long ..... 1. C. mariscus
Leaves with smooth margins; spikelets 5 - 6 mm. long ..... 2. C. sp. near anceps

1. C. mariscus (L.) Pohl var. jamaicense (Crantz) Kukenth. & Peter (Fig. 33) (C. jamaicense Crantz)
Stout perennial herb 4 - 12 ft. high. Panicle very large, 1 - 2 ft. long with terminal and lateral panicles supported by foliaceous bracts. Panicle lax with numerous clusters of 2 - 4 mm. long oblong or ovoid spikelets. Swamps; 6,000 - 6,500 ft.
UGANDA - Kigezi.

2. C. sp. near anceps (Poir.) Hook. (Fig. 34)
Stout perennial up to 3 ft. high with entire-margined leaves. Panicle smaller than the above with subsessile clusters in narrow panicles and longer spikelets. Forming solitary tufts by a stream; 1,000 - 1,500 ft.
TANGANYIKA - Rondo Plateau (Lindi District).

CARPHA R. Br.

Carpha is a small genus of about twelve species recorded from the more or less temperate regions of the southern hemisphere. In East Africa the only species so far recorded occurs at high altitudes in boggy places with high rainfall.

The relatively large spikelets borne on the slender branches of a narrow panicle have 4 - 7 glumes of which the basal ones are empty, the succeeding 1 - 3 mature a trigonous nutlet and the apical ones are empty. Hypogynous bristles are present. The style is 3-branched.

C. eminii (K. Schum.) C.B.Cl. var. eminii (Fig. 17)
(Oreograstis eminii K. Schum.)
Glabrous shortly rhizomatous perennial 1 - 2 ft. high with narrow leaves. Panicles narrow, dense, up to 12 ins. long with foliaceous bracts. Spikelets 5 - 9 mm. long with oblong shining brown glumes. Hypogynous bristles scabrid, barbed. Nutlet small, reticulate. Rare, in mountain bogs; 10,000 ft.
UGANDA - Ruwenzori Mts., endemic.

var. angustissima (Cherm.) Kukenth.
Differs from the above in the narrower leaves, not more than 2 mm. wide, the more slender habit, and the more scanty panicle with spikelets

only 5 - 6 mm. long. Mountain bogs; 10,000 ft.
UGANDA - Ruwenzori Mts., endemic.

TETRARIA Beauv.

Tetraria is a small genus almost entirely confined to South Africa, but there is one species which has been recorded from as far north as the mountains of East Africa. Most of the species are small perennial herbs with narrow panicles. The spikelets have 5 - 12 glumes of which all the lower ones are empty. The terminal glume is female, the one below it is male. Hypogynous bristles are present in some species, including the East African one, but absent in others. The style is 3-branched and the trigonous nutlets are crowned by the persistent style-base. In the Key to Genera, on p. 3-6 of the preceding paper, Tetraria will key out with Carpha. The 2 species which concern us differ markedly in habitat and the length of the hypogynous bristles.

T. circinalis (Schrad.) C.B.Cl. var. usambarensis (K. Schum.)Kukenth.
(T. usambarensis K. Schum.)
Slender herb up to 1 ft. high with leafy stems, the leaves often as long as the stems. Panicle 2 - 6 ins. long and usually rather dense, with numerous cylindric brown spikelets about 8 mm. long. Hypogynous bristles scabrous, shorter than the trigonous nutlet. Sandy places, often with Erica spp.
TANGANYIKA - Mlalo, Usambara Mts..

REMIREA Aubl.

Remirea is a monotypic genus whose only species is widely distributed on sandy shores throughout the tropics. This small creeping leafy perennial has solitary dense heads made up of several spikes. The spikelets have about 3 empty glumes below an apparently terminal bisexual floret. The style is 3-branched and the nutlet trigonous. Hypogynous bristles are absent.

R. maritima Aubl. (Fig. 30)
Glabrous rhizomatous creeping herb with short erect leafy stems about 5 ins. high. The dense pale brownish heads are subsessile among the leaves. The spikelets are 4 - 5 mm. long and have a smooth ellipsoid or linear-oblong nutlet. On dunes and sandy shores; sea level.
ZANZIBAR - Zanzibar Island.

RHYNCHOSPORA Vahl

Rhynchospora is one of the larger genera of sedges having a world wide distribution , with its main centre in the southern hemisphere, in South America. Only about ten species have been recorded in Eastern Africa where they mostly occur in the lower lying swampy grasslands, dambos etc. below 4,000 ft.

Many of the African species of Rhynchospora are slender leafy annuals with setaceous leaves and a more or less corymbose or subumbelliform inflorescence of brown spikelets. The perennial species are more varied with corymbose inflorescences or with one or more dense spherical heads of white or brown spikelets. The spikelets are composed of numerous glumes of which the lowest 3 are empty, the succeeding 1 - 4 female and the uppermost male or empty. Hypogynous

bristles may be conspicuous and at least as long as the nutlet, small, or absent. The style is bifid either at the tip only, or with the branches longer than the style; the style-base is swollen and persistent on the biconvex, obovoid or narrowly oblong, smooth or transversely wrinkled, nutlet.

One anomalous species in the past included here is R. erinacea (Ridley) C.B.Cl. which has a three-branched style and a more or less compressed nutlet not unlike that of some Rhynchosporeae but without the persistent swollen style-base so characteristic of the genus. This species has also been placed in Cyperus - C. erinaceus (Ridley) Kukenth. - but it has many features inappropriate to such a position too. It is probably necessary to create a new monotypic genus for this very distinctive sedge, but in the meantime it seems preferable to utilise C.B.Clarke's name as its affinities appear to lie more with Rhynchospora.

Key to Species

1. Heads solitary up to 25 mm. wide; style 3-fid; anomalous species ..... 10. R. erinacea
   Spikelets variously arranged, but if in dense solitary heads then these much smaller; style 2-fid or subentire 2

2. Styles entire or bifid at the tip only (Haplostyleae) 3
   Styles deeply bifid (Diplostyleae)..... 5

3. Small annual with a dense solitary head ..... 3. R. parva
   Perennials with paniculate or usually several-headed inflorescences 4

4. Spikelets pedicellate, in fascicles ..... 1. R. corymbosa
   Spikelets sessile, in dense globose heads... 2. R. holoschoenoides

5. Hypogynous bristles always conspicuous (use hand lens)..... 6
   Hypogynous bristles absent 7

6. Spikelets less than 5 mm. long, 2 - 3-flowered ..... 4. R. rugosa
   Spikelets over 5 mm. long, many-flowered ..... 5. R. africana

7. Stout-culmed perennial; spikelets whitish, obtuse... 9. R. candida
   Slender-culmed annuals; spikelets acute, brownish 8

8. Nutlets smooth ..... 6. R. brevirostris
   Nutlets transversely rugose 9

9. Corymbs on peduncles ¾ - 1 in. long; rhachilla of the spikelet a zigzag; nutlet finely rugose.7. R. subquadrata
   Corymbs shortly pedunculate or sessile; nutlets coarsely rugose, rhachilla not zigzag ..... 8. R. perrieri

1. R. corymbosa (L) Britt. (Fig. 31)
   (R. aurea Vahl)

Stout glabrous perennial 4 - 10 ft. high with flat leaves up to 1 in. wide. Panicle compound, copious, of terminal and lateral corymbs of brown spikelets about 10 mm. long. Rivers and swampy places,

usually in shade ; sea level - 5,500 ft.
TANGANYIKA - Bukoba, Mafia Island, Southern Highlands.
UGANDA - Sese Islands.
ZANZIBAR - Zanzibar Island.

2. R. holoschoenoides (L.C. Rich.) Herter (Fig. 32)
(R. cyperoides (Sw.) Mart., R. mauritii Steud.)
Stout glabrous perennial with inflated cross-veined leaf-sheaths. Inflorescence of several globose pale brownish or greenish heads up to 10 mm. wide borne on long peduncles, more rarely the heads solitary. Spikelets 4 - 5 mm. long with dark brown nutlets 2 mm. long. In very wet sandy places, shallow streams, rice fields and seasonally flooded grasslands; sea level - 4,000 ft.
TANGANYIKA - Mafia Island.

3. R. parva (Nees) Steud. (Fig. 26)
(R. minor Nelmes, R. wallichiana in Fl. Trop. Afr.)
Glabrous narrow-leaved annual about 6 ins. high. Inflorescence a solitary bracteate head 5 - 12 mm. wide. Spikelets 3 - 4 mm. long. Brackish and fresh water marshes; sea level - 100 ft.
TANGANYIKA - Mafia Island.
ZANZIBAR - Zanzibar Island.

4. R. rugosa (Vahl) Gale (Fig. 29)
(R. brownii Roem. & Schult., R. glauca Vahl)
Tufted perennial 1½ - 3 ft. high with narrow leaves. Corymbs rather dense, with brown spikelets 3 - 4 mm. long and brown finely rugose nutlets 2 - 3 mm. long. Swampy grassland; 4,000 - 5,000 ft.
TANGANYIKA - Bukoba, Songea.

5. R. africana Cherm. (Fig. 28)
(R. glauca ssp. africana (Cherm.) Bos)
Tufted perennial up to 2 ft. high with filiform leaves. Corymbs usually scanty, with large brown spikelets 6 - 10 mm. long and brown finely rugose nutlets 3 - 4 mm. long. Swampy ground; 1,500 - 4,000 ft.
TANGANYIKA - Bukoba, Southern Region.

6. R. brevirostris Griseb.
(R. barteri C.B.Cl.)
Slender annual 6 - 9 ins. high with filiform leaves. Inflorescence small, corymbose, congested, with brownish spikelets 3 - 4 mm. long and smooth shining nutlets. Seasonally swampy soils, often on lateritic outcrops; 3,000 - 4,000 ft.
TANGANYIKA - Songea.

7. R. subquadrata Cherm.
Densely tufted slender plant, probably annual, ½ - 2½ ft. high. Panicle rather scanty with brown spikelets 5 - 10 mm. long and whitish or grey finely rugose nutlets. Damp places, dambos and swampy grasslands; 2,000 - 5,000 ft.
TANGANYIKA - Sumbawanga, Songea.

8. R. perrieri Cherm. (Fig. 27)
Slender annual ¼ - 1½ ft. high. Inflorescence contracted, dense, with brown spikelets 4 - 5 mm. long and transversely rugose nutlets becoming almost black. Damp shady places; sea level - 100 ft.
ZANZIBAR - Pemba Island.

9. R. candida (Nees) Boeck. (Fig. 25)
Stout perennial 2 - 3 ft. high with narrow leaves. Inflorescence a corymb of rather large white spikelets 8 - 14 mm. long, with dark grey smooth shining nutlets. Flooded grassland, and drainage lines; sea level - 4,000 ft.
TANGANYIKA - Bukoba, Kigoma, Bagamoyo, Mafia Island, Southern Region.
UGANDA - Masaka, Sese Island.

10. R. erinacea (Ridley) C.B.Cl.
(Cyperus erinaceus (Ridley) Kukenth.)
Stout rhizomatous perennial up to 4 ft. high with stem leaves 4 - 5 mm. wide. Heads dense with 2 - 3 long reflexed green bracts. Spikelets terete, whitish, with 5 - 6 opposite empty glumes and a bisexual terminal flower. Hypogynous bristles absent. Style-base neither enlarged nor persistent on the large, narrowly oblong nutlet. Brachystegia woodland, locally common; 4,000 - 5,500 ft.
TANGANYIKA - Sumbawanga, Songea.

Excluded species. From the description of R. setacea (Berg.) Boeck. var. semisetacea by Kukenthal, the material collected by Holtz near Dar es Salaam seems to be very distinct from the S. American species and to be more akin to R. subquadrata and R. perrieri. Possibly it should be placed with one of these species, but its identity must remain in abeyance until the specimen can be re-examined.

Explanation of Figures

PLATE I

Figs. 1, 5. Scleria globonux - 1,x 1; 5,x 2
Figs. 2, 4. Scleria bulbifera - 2,x 1; 4,x 2
Fig. 3. Scleria catophylla - x 1
Figs. 6, 8. Scleria greigiifolia - 6,x 2; 8.x 1
Fig. 7. Scleria racemosa - x 2
Fig. 9. Diplacrum africanum - x 1
Fig. 10. Scleria barteri - x 1
Fig. 11. Scleria rehmannii - x 1

PLATE II

Fig. 12. Hypolytrum testui - x ½
Figs. 13,14. Hypolytrum heteromorphum - x 1
Figs. 15,16. Coleochloa setifera - 15,x 2; 16,x ½
Fig. 17. Carpha eminii - x ½
Fig. 18. Ascolepis peteri - x 10
Fig. 19. Ascolepis pusilla - x 10
Figs. 20,21. Ascolepis protea - 20,x 2; 21,x 5
Fig. 22. Ascolepis elata - x 5
Fig. 23. Ascolepis capensis - x 5
Fig. 24. Coleochloa abyssinica - x 2

PLATE III

Fig. 25. Rhynchospora candida - x 1
Fig. 26. Rhynchospora parva - x 1
Fig. 27. Rhynchospora perrieri - x 1
Fig. 28. Rhynchospora africana - x 1
Fig. 29. Rhynchospora rugosa - x 1
Fig. 30. Remirea maritima - x ½
Fig. 31. Rhynchospora corymbosa - x ½
Fig. 32. Rhynchospora holoschoenoides - x ½
Fig. 33. Cladium mariscus - x ½
Fig. 34. Cladium sp. near anceps - x ½

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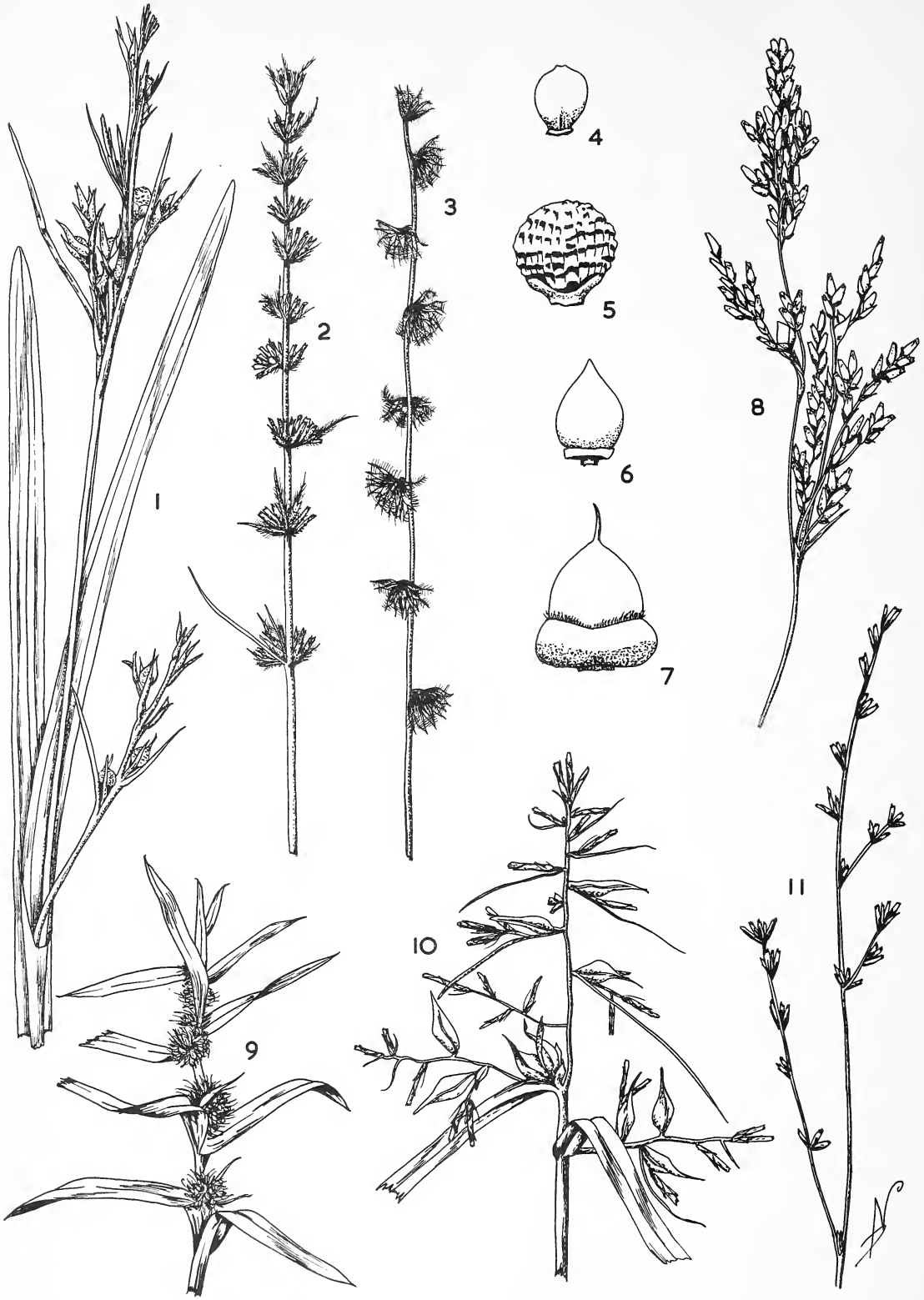


PLATE I

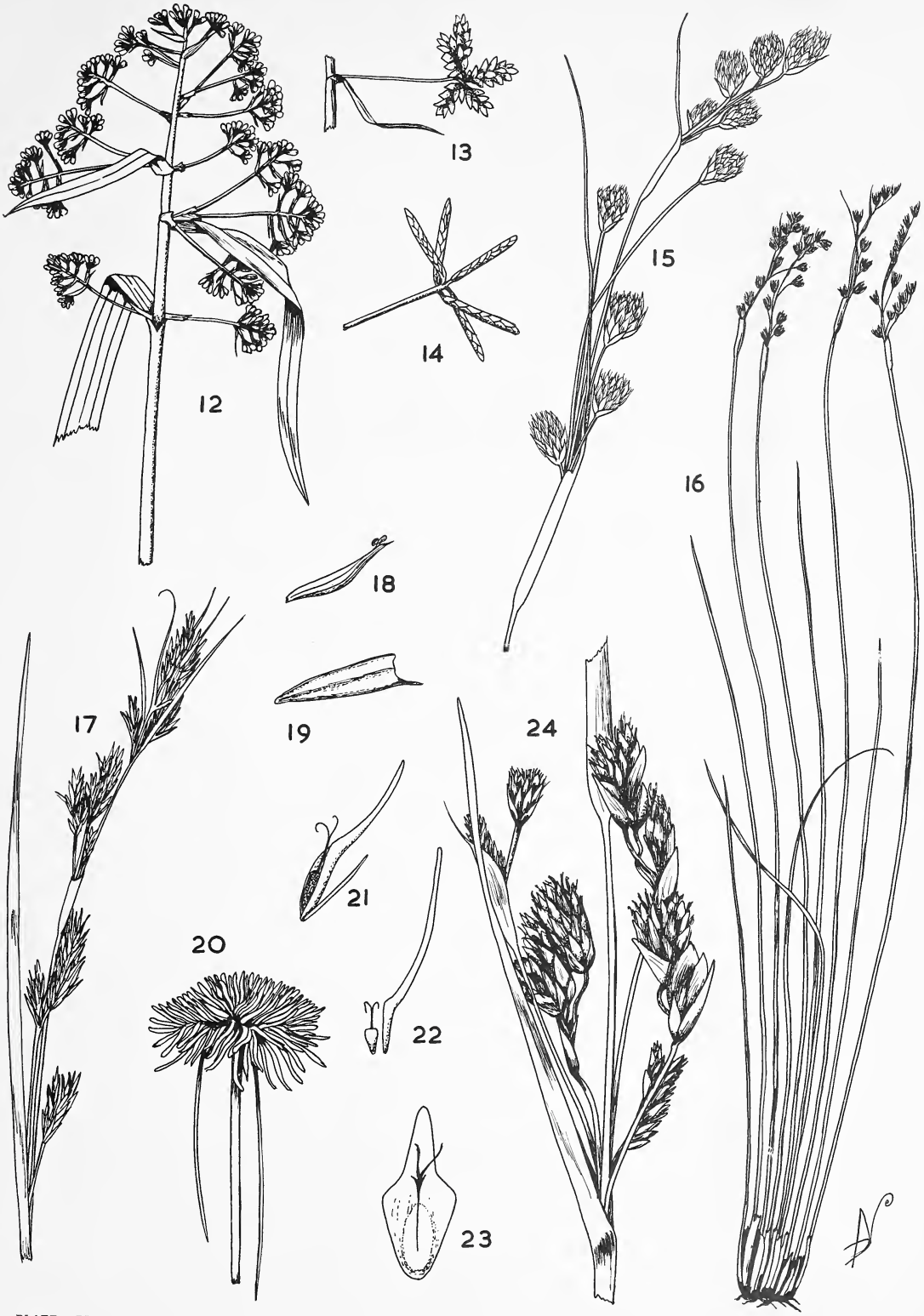


PLATE II

PLATE III

A NEW GENUS AND SPECIES OF PYRALINAE FROM AFRICA

(LEPIDOPTERA, PYRALIDAE)

By

PAUL E.S. WHALLEY
(British Museum (Natural History))

Amongst material recently submitted for determination by Mr. R.H. Carcasson of the Coryndon Museum, Nairobi, was a series of a remarkable new Pyralid. This was believed to be the second known species of the genus Macna Walker (Chrysauginae) from Africa. This subfamily is primarily New World in distribution, with a few species, perhaps doubtfully included, from the Old World. Of the Old World species, Macna hampsoni Distant is known from Africa together with one or two other species.

When the holotype of Macna hampsoni Distant was re-examined it was found that it shared characters which were given in Hampson's definition of the two subfamilies, Pyralinae and Chrysauginae, (Hampson 1896, Trans. ent. Soc. Lond. 1896: 451, and 1897, Proc. zool. Soc. Lond. 1897: 633). In the hind wing Sc + R and Rs approximate but do not anastomose, the maxillary palps and proboscis are small and a chaetosema is absent. Comparison of the holotype of M. hampsoni and the new species with the holotype of Macna pomalis Walker (type species of Macna Walker) showed that while the former two species were congeneric they were not congeneric and probably not in the same subfamily with M. pomalis Walker. I am therefore proposing a new genus for M. hampsoni and the new species, and in spite of some overlap in characters, am placing it in the Pyralinae.

MITTONIA gen. n.

Forewings with R3 reduced or absent: abdomen with tympanal organs simple: chaetosema absent: ocelli present. Male genitalia with swelling on the basal part of costa of valve: gnathus enlarged at junction of arms: uncus turned ventrad from base: female with long anal papillae: bursa covered with small spines: signum absent. Type species, Mittonia carcassoni sp. n.

I am transferring M. hampsoni Dist. to the Pyralinae and placing it in the genus Mittonia Whalley. (Mittonia hampsoni Distant, comb.n.).

The exact relationship of this genus to others in the Pyralinae will have to await a detailed study of the subfamily. Tentatively I am placing it near Xenomilia Warren. It can be distinguished from Xenomilia by the absence of R3 in the forewing and the short labial palps (1½ - 2x diameter of eye in Macna, 3 - 4x diameter of eye in Xenomilia)

MITTONIA CARCASSONI sp.n.

Holotype ♂, Wing 22 mm. (centre mesothorax to apex of forewing).

Head: Frons flattened, proboscis small; labial palps 1½ x diameter of eye; scales on head reddish brown.
Thorax: Patagia similarly coloured; tegulae reaching base of hindwing, greyer than thorax.
Abdomen: Yellowish brown, no conspicuous markings.
Legs: Fore and mid legs reddish brown, long scales on dorsal side of fore tibia, very long scales on mid tibia: hindlegs yellowish brown, long scales on tibia.

Upperside

Forewing: General colour olive green with brown basal area. Pattern as figured. Costal margin sinuate, apex projecting: terminal margin incised anteriorly, slightly sinuate posteriorly: terminal line dark green interspersed with brown scales giving a brown-edged appearance to terminal margin. Subterminal area olive green with reddish brown scales over veins; subterminal fascia a pale line, strongly serrate; two white scale patches between 1a and Cu2 and Cu2 and Cu1, anterior patch largest: dark olive patch in median area: antemedial line angled from basal third of hind margin to median area of cell: white, edged with black, finger-like shape on median area; scales in this area light brown, interspersed with reddish brown and a few mauve scales: outline on finger process continued towards costa with smaller tooth: before reaching costa line darkens and thickens: basal area reddish brown: hind margin slightly sinuate.

Hindwing: General colour olive green, margin brown: subterminal line strongly serrate: median area olive green: median fascia pale: basal area olive green interspersed with white scales giving paler appearance than median area: prominent tuft of black scales on hind margin.

Underside:

Forewing: General colour reddish brown; large patch of scent scales on base of cell; long hair-like scales over most of cell; white patches between veins 1a, Cu2 and Cu1 prominent, anterior one almost spherical.

Hindwing: As forewing but without white spots: inner hind margin strongly irrorate with white scales: submedian fascia a pale line of scales posteriorly, darkening anteriorly.

Allotype ♀, Wing 24 mm. Labial palps 2 x diameter of eye.

Upperside: General colour reddish brown, irrorate with darker scales: pattern as figured. Antemedial line angled from basal third of hindwing to median area, widening anteriorly to form olive green patch: two white patches between 1a, Cu2 and Cu1 present in ♂ are largely obscured in ♀ by dark scales.

Underside: Fore and hindwings general colour reddish brown. Costa of forewing paler olive green: two white spots conspicuous between 1a, Cu2 and Cu1: forewing with long hair-like scales over cell: scent patch on forewing and scale tuft on hindwing absent.

Genitalia: ♂ fig.3 The most striking feature is the strongly reflexed uncus and the heavily sclerotised patch of tooth-like scales on the basal part of the valve.
♀ fig.4 The opening of the ductus bursa and the bursa itself are covered with small spines.

Variation from holotype specimen:

♂ Wing 20 - 24 mm. (8 examples) There is little variation in pattern but the olive green colour tends to fade to a more uniform brown.
♀ Wing 24 - 25 mm. (5 examples) The coloration tends to be paler in the older specimens, otherwise little variation is present in the material examined.

Materia examined:

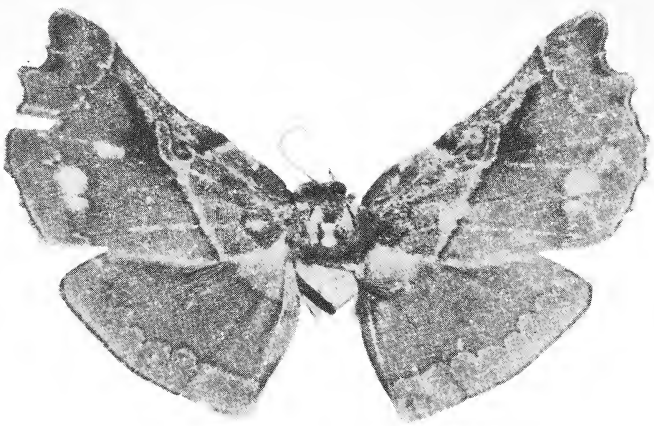
Holotype ♂, Uganda, Entebbe, March 1961, N. Mitton, in British Museum (Natural History.) (fig. 1)
Allotype ♀, Uganda, Entebbe, March 1961, N. Mitton, in British Museum (Natural History). (fig. 2)
Paratypes 1 ♂, One specimen, data as type in Coryndon Museum, Nairobi.
3 ♂, Uganda, Entebbe, Feb. 1962, D. Bartlett, in Coryndon Museum, Nairobi.
1 ♂, Cameroons, Bitje, Ja River, S. Cameroons, April June 1910, G.L. Bates, in British Museum (Natural History)
1 ♂, Cameroons, Bitje, Coll. W. Schaus, in American Museum of Natural History, New York.
1 ♀, Uganda, Entebbe, Sept. 1954, J.A. Burgess, in Coryndon Museum, Nairobi.
2 ♀, Uganda, Entebbe, Feb. 1962, D. Bartlett, in Coryndon Museum, Nairobi.

M. carcassoni can easily be distinguished from its closest relative Mittonia hampsoni Distant by the general shape and the olive green colour which contrasts with the bright green of M. hampsoni. The uncus of the male of M. hampsoni is long and thin and this species lacks the prominent sclerotised scale group on the base of the valve. The female M. hampsoni has shorter anal papillae and the bursa opening is simpler than in M. carcassoni.

Acknowledgement

The author wishes to express his thanks to Mr. M. Shaffer for drawing figures 3 and 4.

(Received for publication 18th. April 1964)

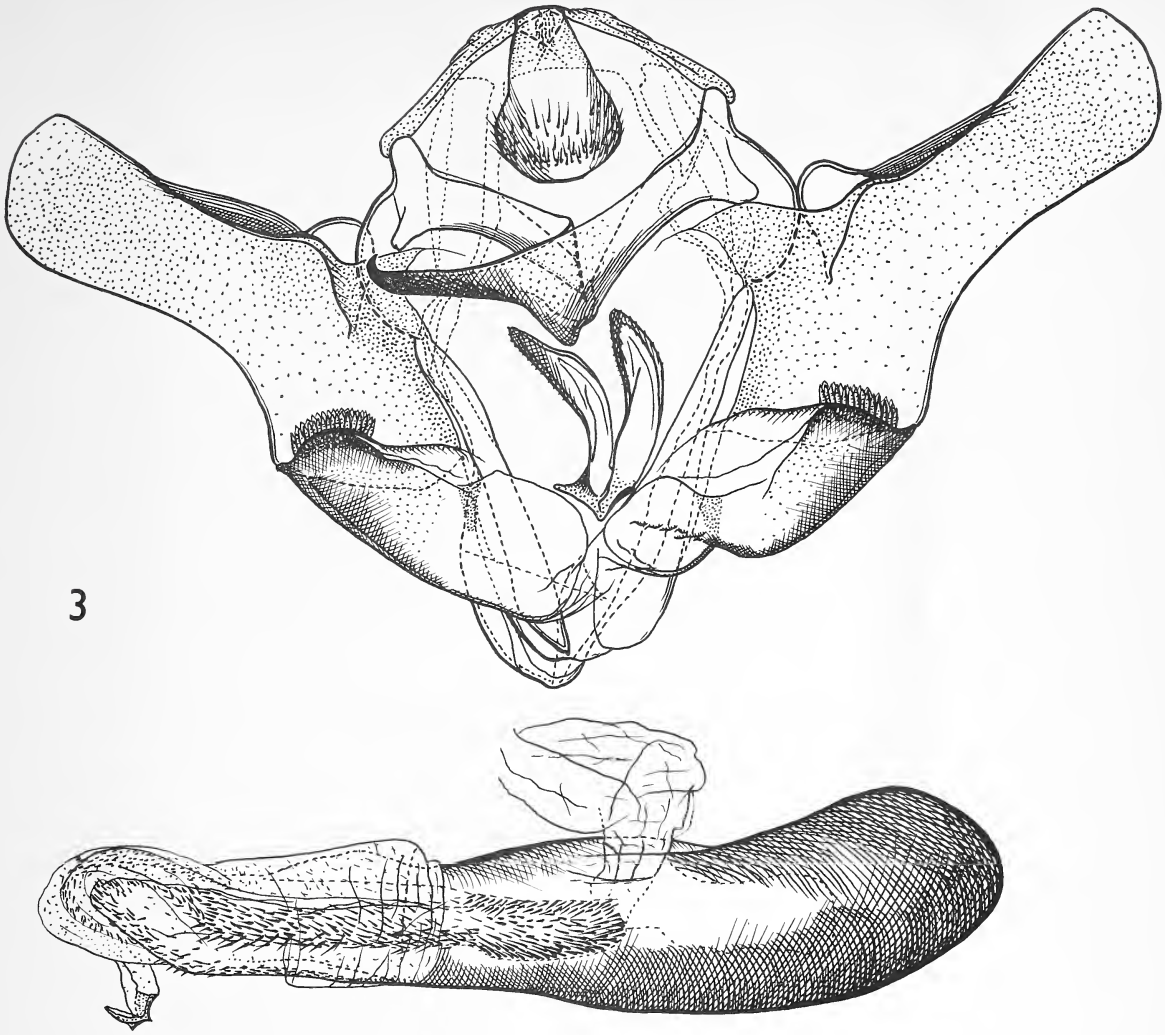


1

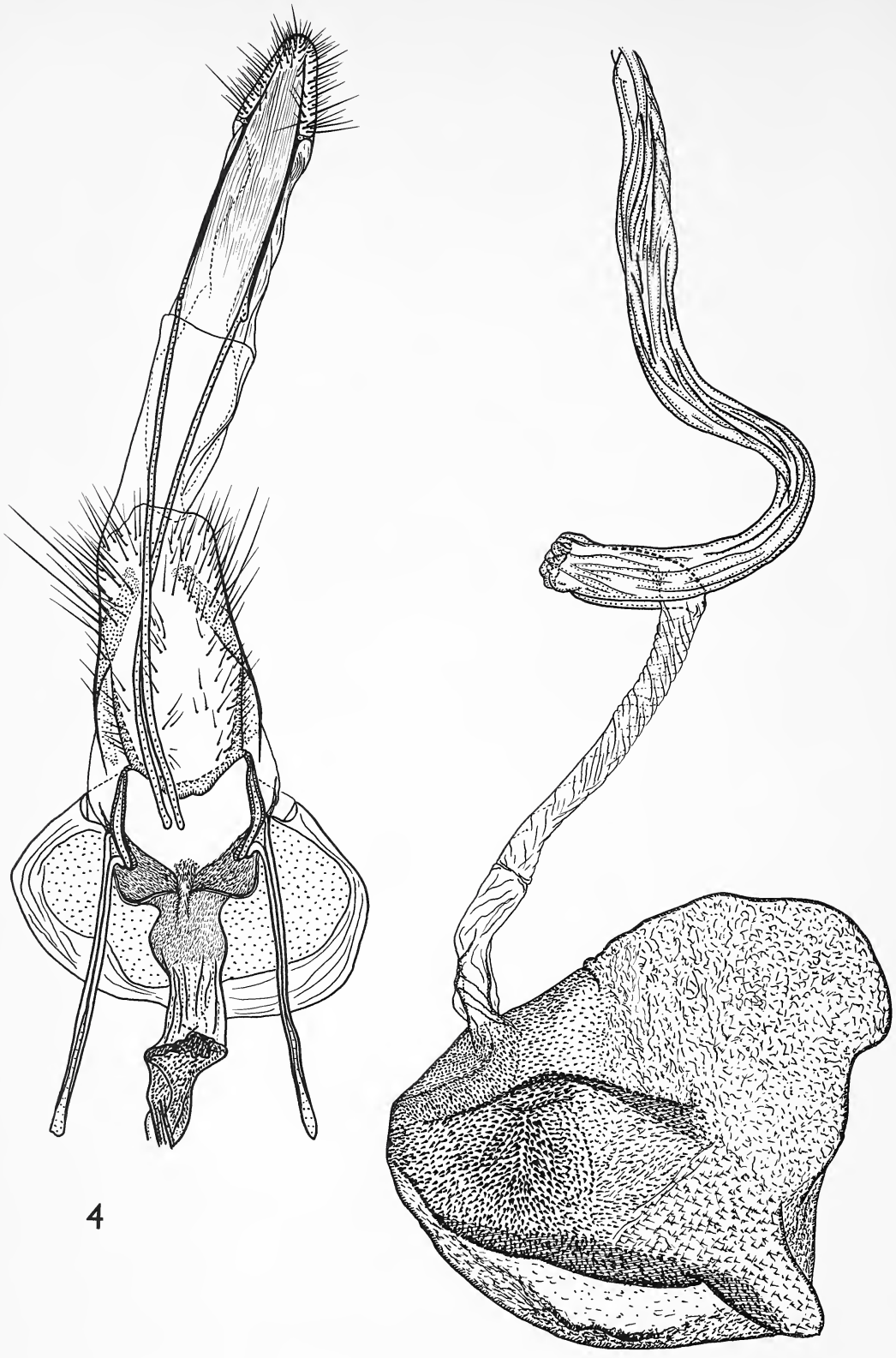
MITTONIA CARCASSONI Whalley ♂

2

MITTONIA CARCASSONI Whalley ♀



MITTONIA CARCASSONI Whalley : male genitalia



4

MITTONIA CARCASSONI Whalley : female genitalia

NEW AFRICAN MOTHS

By

R.H. CARCASSON

PIGIOPSIS AURANTIACA sp. nov. (Geometridae, Ennominae) (Figs. 1,33)

FEMALE
Antennae: dark brown, paler apically, not pectinated.
Head: vertex dark brown, almost black, frons brown, palpi ochraceous orange (R).*
Thorax, abdomen and legs: ochraceous buff (R).

Upperside
Forewing: ground colour ochraceous buff (R) proximally, ochraceous orange (R) distally. A dark brown dot at end of cell; a dark brown streak from costa, near apex of vein 7; traces of a diffuse brown spot in cellule 6; a faint, diffuse brown streak near tornus, almost obsolete in some specimens.

Hindwing: uniformly ochraceous orange (R), paler at base; a small dark spot at end of cell; one Paratype has a faint postmedial line in both wings, continued from the preapical streak of the forewing.

Underside
Yellow ochre (R) lightly speckled with brown; a dark brown dot at end of cell in both wings; a more or less complete series of diffuse dark brown internervular spots from costa (near apex) to tornus of fw, continued in some specimens by a series of smaller, more reddish internervular spots in hw.
Measurements: fw, base to apex 13 mm.
Genitalia: signum shaped like a short, broad tape, folded at the extremities, rather like a scroll, armed with minute teeth and ridges and marginally serrated.

MALE
Unknown.

Holotype ♀ : Shimba Hills, Mombasa, Kenya, XII-1961 R. Carcasson, to be deposited in British Museum (Natural History).
♀ Paratypes four: same data as Holotype, in Coryndon Museum, Nairobi.

PIGIOPSIS UGANDANA sp. nov. (Ennominae) (Figs. 2,3,34,47)

Allied to P. hyposcotia Prout, but much larger.

MALE
Antennae: shaft and pectinations dark brown.
Head: vertex and frons dark sepia brown, palpi ochraceous orange (R).
Thorax and abdomen: ochraceous tawny (R) above, yellow ochre (R) below.
Legs: yellow ochre (R).

Upperside
Ground colour ochraceous tawny (R), faintly irrorated with brown;

* Colours marked R are taken from Ridgway's "Color standards and Color nomenclature".

costa of fw mottled with blackish brown, with two prominent blackish spots near apex, the proximal one prolonged into a short, faint oblique brown streak in cellules 7 and 6; a small dark brown dot at end of cell in both wings.

Underside
Ochraceous orange (R), lightly speckled with dark brown; a faint brown postmedial fascia from preapical spot of fw to inner margin of hw.
Measurements: fw, base to apex 16 mm.
Genitalia: uncus hood-shaped; valve bilobed, as in Zamarada, the proximal lobe being a long slender process rising from the costa at base; ventral margin terminating in a stout, inwardly directed subapical hook; aedeagus missing.

FEMALE
Very similar to male, but antennal pectinations shorter, traces of a postmedial fascia in fw above.
Measurements: fw, base to apex 18 mm.
Genitalia: signum shorter than in P. aurantiaca Carcasson, with more pointed extremities, furnished at side with a more heavily chitinised proximal plate; posterior margin not serrated, ridges weaker than in P. aurantiaca.

Holotype ♂ and Allotype ♀: Katera, Sango Bay, Masaka, Uganda, X-1960, R.H. Carcasson, to be deposited in British Museum (Natural History). One Paratype ♂, same data as Holotype, in Coryndon Museum, Nairobi.

ZAMARADA OPALA sp. nov. (Ennominae) (Figs. 4,5,57,58)

MALE
Antennae, head, body and legs light brown (tawny olive R); antennae pectinated.

Upperside
Forewing: ground colour translucent pale brownish yellow, almost hyaline, lightly speckled with pale brown; costa densely striated with dark brown and light brown; a large light brown (tawny olive R) reniform spot at end of cell; base clay color (R); a narrow dark brown postmedial line edged distally with silver grey scales from costa at ⅔ from base to middle of inner margin, strongly curved towards termen from vein 5 to vein 2 where it forms an almost right angle before continuing to inner margin; a narrow dark brown terminal line from apex to tornus; marginal area between postmedial and terminal tawny olive (R), indistinctly marked with internervular cinnamon wedges; cilia pale brownish yellow chequered with dark brown between ends of veins.

Hindwing: similar to fw, but reniform spot at end of cell smaller; postmedial strongly curved towards termen between veins 5 and 2, as in fw.

Underside
Similar to upperside, but light brown terminal area of both wings uniform in colour and dark postmedial and terminal lines absent.
Measurements: fw, base to apex 19 mm.
Genitalia: uncus long and broad, apically bilobed; gnathos well developed and armed with short teeth; valve apically trilobed, with a long slender hook-like projection rising from costa at base; aedeagus terminating in a long spine, a slender structure armed with apical teeth and a

short rounded lobe.

FEMALE
Very similar to male, but pectinations of antennae very short.
Measurements: fw, base to apex 18 mm..
Genitalia: signum large, strongly chitinised, reniform, armed with regular marginal spines as well as with dorsal spines.

Holotype ♂: Opala, Lomami River, Prov. Orientale, Congo ex-Belge, III-1959, R.H. Carcasson, to be deposited in the British Museum (Natural History).
Allotype ♀: Ikela, Tchuapa River, Equateur, Congo ex-Belge, III-1959, R.H. Carcasson, to be deposited in British Museum (Natural History).

EPIGYNOPTERYX JACKSONI sp. nov. (Ennominae)(Figs. 13,48)

A large species, allied to E. flexa Prout.

MALE
Antennae: shaft pale ochreous at base, dark brown elsewhere; pectinations dark brown.
Head: vertex and lower portion of frons ochraceous buff (R); upper part of frons and palpi dark brown.
Thorax: collar brown, remainder light buff (R) above and below; some brown spots on dorsum.
Legs: first pair brown, second and third light buff speckled with brown.
Abdomen: light buff, sparsely speckled with brown above and below.

Upperside
Forewing: ground colour light pinkish cinnamon (R) mottled and speckled with dark brown and creamy white; costa pale ochreous irrorated with light brown; antemedial band irregular, pale olive green, mottled with pale yellow and creamy white; postmedial band pale olive green mottled with yellow, edged proximally with dark brown scales, particularly at the veins, creamy white at costa near apex, very irregular and strongly indented at the veins; a prominent blackish spot at end of cell; area distal to postmedial paler; three indistinct, irregular submarginal lunules in cellules 1b, 2 and 3; apex acute, margin regular.

Hindwing: ground colour as in fw, but paler near costa and darker (sayal brown R) near outer margin from vein 4 to tornus and near distal half of inner margin; traces of a very indistinct pale olive postmedial band, strongly indented at the veins, from vein 5 to inner margin; a very indistinct pale olive spot in cellule 4 and another in 5; traces of an irregular dark brown submarginal line from vein 3 to tornus; margin very slightly angled at end of vein 3, otherwise regular; tornus acute.

Underside
As above, but more densely speckled with brown; olive green bands less distinct.
Measurements: fw, base to apex 24 mm..
Genitalia: uncus long and narrow, not terminating in a sharp point; valve long and narrow with almost parallel margins, apex bilobed; aedeagus not heavily chitinised.

FEMALE
Unknown.

Holotype ♂: Kayonza, Kigezi, Uganda, V-VI-1957, T.H.E. Jackson, to be deposited in British Museum (Natural History).

RHODOPHTHITUS PSEUDABRAXAS sp. nov. (Ennominae)(Figs. 14,35)

Allied to R. myriastictus Prout.

MALE
Antennae: black.
Head: vertex and frons ochraceous buff (R), palpi blackish, tipped with ochraceous buff.
Thorax: ochraceous buff (R) anteriorly and below; dorsum light buff (R) with black spots.
Legs: first and second pairs: femora ochraceous buff, tibiae and tarsi blackish; third pair: femora and tibiae ochraceous buff, tarsi blackish.
Abdomen: creamy white above and below; a complete black distal ring on each segment; anal tuft ochraceous buff.

Upperside
Forewing: basal and discal area creamy white; variable blackish spots and vermiculations at costa and near base; a blackish spot at end of cell, usually merging with apical area; apical and terminal area broadly blackish; inner edge of blackish terminal area very irregular and breaking into rounded spots, particularly in Paratype.

Hindwing: creamy white with a blackish spot at end of cell and a broad blackish margin enclosing four terminal white spots near tornus in Paratype; some blackish spots in discal area and blackish margin not entire, but broken into irregular blotches in Holotype; black markings somewhat asymmetrical in both specimens.

Underside
As above, but blackish markings slightly paler.
Measurements: fw, base to apex 23-24 mm..
Genitalia: uncus short and blunt, slightly hairy; valve long and narrow with a hairy costal flange along entire length; juxta spatulate, heavily chitinised, armed apically with minute teeth; aedeagus long and stout, terminating in a pointed plate; vesica armed with a series of parallel chitinous rods.

FEMALE
Unknown.

Holotype ♂: Nya Nya, Ituri Forest, Congo ex-Belge, III-1959, R.H. Carcasson, to be deposited in British Museum (Natural History).
One Paratype ♂: Mambili Forest, Ouesso, ex-French Equatorial Africa, VI-1960, T.H.E. Jackson, in Coryndon Museum, Nairobi.

SPHINGOMIMA MABIRA sp. nov. (Ennominae) (Figs. 10,31)

Allied to S. virissa Prout, but differs in its smaller size and in its much darker colour; differs from S. cinereomarginata Holland in being larger, in the less falcate apex of the fw and in being more uniformly dark olive (R).

MALE
Antennae: shaft whitish, pectinations blackish and shorter than in S. virissa.
Head: vertex covered in long straw yellow (R) scales which project beyond the frons; some dark olive scales in centre; frons and palpi dark grey.
Thorax: dark olive above, light brownish olive (R) below.
Legs: femora and tibiae pale brown, somewhat rufous, tarsi darker.
Abdomen: blackish olive above, light brownish olive (R) below; anal tuft pale brown.

Upperside
Forewing: ground colour dark olive with diffuse black irrorations; basal third, middle and areas of costa proximal and distal to preapical curve whitish pink speckled with dark scales; apical area, terminal area and distal third of wing at tornus speckled with pale grey and pale brown.

Hindwing: ground colour dark olive faintly irrorated with black; costal area paler; a small whitish spot at end of cell; a blackish line from costa at ¾ from base to inner margin at ⅔ from base; area distal to blackish line grey, speckled with black and pale brown scales.

Underside
Forewing: ground colour brownish olive (R) lightly speckled with black scales; costal area paler from base to preapical curve; costa itself speckled with pink along its entire length; a small whitish spot at end of cell and a diffuse dark fascia from preapical costal curve to cubitus; a straight dark line from inner margin at ¾ from base to vein 7, where it bends sharply towards base before reaching costa; a prominent dark spot at costa where dark line ends; a more or less distinct pale grey submarginal spot in cellule 5 and sometimes a more diffuse one in cellule 6.

Hindwing: ground colour uniform brownish olive lightly speckled with black scales; white cell spot as above; dark line as above, but broader and more distinct, edged distally with grey scales.
Measurements: fw, base to apex, 18 mm..
Genitalia: uncus short, broad and blunt; valve elongated, apically rounded; aedeagus short and stout, cornuti absent.

FEMALE
Unknown.

Holotype ♂: Mabira Forest, Jinja, Uganda, X-1962, R.H. Carcasson, to be deposited in British Museum (Natural History).
♂ Paratypes: 4, same data as Holotype, in Coryndon Museum, Nairobi.

SPHINGOMIMA MANYARA sp. nov. (Ennominae) (Figs. 11,32)

Allied to S. virissa Prout, but smaller and lacking prominent white cell spot in hw.

MALE
Antennae: shaft dirty white, pectinations pinkish buff (R).
Head: vertex dirty white, frons and palpi cinnamon (R).
Thorax and abdomen: pinkish buff (R) above, cinnamon below.
Legs: pinkish buff above and below.

Upperside

Basal ⅔ of both wings cinnamon buff (R), irrorated with blackish; distal third pinkish buff speckled with a few blackish scales; a minute hyaline dot surrounded by black scales at end of fw cell; a diffuse dark line from costa of fw, near origin of vein 7 to inner margin of hw at ⅔ from base, edged proximally with pale scales from costa to vein 2 of fw, becoming more distinct and without pale proximal edge from vein 2 of fw to inner margin of hw; the dark line separates the darker basal ⅔ from the paler terminal areas.

Underside

Uniformly cinnamon buff (R) speckled with black; dark line as above, but generally better defined; hyaline dot at end of fw cell less thickly surrounded by black scales.

Measurements: fw, base to apex, 17 mm..

Genitalia: uncus longer, narrower and more pointed than in S. mabira Carcasson; valves narrower and more spatulate; aedeagus longer and more heavily chitinised.

FEMALE

Unknown.

Holotype ♂: Lake Manyara, Tanganyika, IV-1961, A. Morgan-Davies, to be deposited in British Museum (Natural History).

THENOPA PSEUDONIGRARIA sp. nov. (Ennominae) (Figs. 6,37)

Very closely allied to T. nigraria Swinhoe, but differs in having a larger, spatulate uncus, differently shaped valves and cornuti.

MALE

Antennae: shaft buffy brown (R), pectinations darker.

Head: vertex dark purplish brown (bone brown R), frons darker, palpi rufous.

Thorax: tegulae and patagia bone brown (R), dorsum buffy brown (R), pectus violaceous brown (army brown R).

Legs: snuff brown (R) speckled with black.

Upperside

Forewing: ground colour bone brown (R) speckled with black; a dark brown line from middle of costa to origin of veins 3 and 4, broader at costa, continuing irregularly beyond a sharp indentation distad at cubitus, to middle of inner margin; a few whitish scales proximal to dark line at cubitus and at vein 1; a small black triangular spot at end of cell; a straight dark brown line from preapical costal curve to inner margin at ⅔ from base, followed distally by an irregular dark brown suffusion which reaches termen in cellules 3 and 2 and again at tornus; a few whitish scales near veins, distal to straight line; two pale costal spots near origin of vein 7; some pale grey scales in cellules 4 and 5 and a few whitish scales at apex; termen regular with slight internervular indentations from apex to vein 3, strongly concave from vein 3 to tornus.

Hindwing: bone brown (R) with a few scattered black scales and very faint vinaceous irrorations; an irregular dark brown spot edged with whitish scales at origin of veins 3 and 4 and a similar, but larger such spot near inner margin, just over half way from base; termen irregular, strongly produced at veins 4 and 3 and strongly concave from vein 3 to tornus.

Underside
Ground colour light vinaceous brown (walnut brown R) striated with blackish; hw somewhat redder than fw; costa of fw irregularly mottled dark brown and buff; a prominent triangular cream coloured costal spot at origin of vein 7; apical area of fw darker reddish brown, without black striae; a large, prominent pale grey spot with diffuse margins in cellules 3 and 4 of fw; a regular series of small whitish spots on the veins from the origin of vein 7 to the middle of vein 2 of fw, continued on hw from costa to inner margin, just above tornus.
Measurements: fw, base to apex 12 mm..
Genitalia: uncus narrower than in T. nigraria Swinhoe and not spatulate; valves lanceolate with margins regular and entire, bluntly pointed apices; aedeagus short and stout, armed apically with numerous short spines.

FEMALE
Unknown.

Holotype ♂: Mabira Forest, Jinja, Uganda, X-1962, R.H. Carcasson to be deposited in British Museum (Natural History).

XENIMPIA OPALA sp. nov. (Ennominae) (Figs. 9,51)

Closely allied to X. sillaria Swinhoe, but differs in having the grey basal area of fw much reduced.

MALE
Antennae: brownish grey.
Head: vertex pale buff, frons and palpi greyish brown.
Thorax: tegulae brownish grey, patagia and dorsum pale buff; pectus pale buff speckled with brown.
Legs: pale buff speckled with brown.
Abdomen: pale buff above and below.

Upperside
Forewing: anterior part, including costa from inner margin at 4 mm. from base to cubitus and thence to end of vein 4 greyish brown (hair brown R); remainder of wing pale buff (cream buff R); some pale buff scales at costa, particularly in distal half and a prominent pale buff costal spot 3 mm. from apex; three small pale submarginal lunules in cellules 4,5 and 6; a broad straight light cinnamon (sayal brown R) band from base of vein 4 to just beyond middle of inner margin; three indistinct light brown submarginal streaks in cellules 1b, 2 and 3.

Hindwing: uniformly pale tawny buff (clay color R), somewhat paler at costa; four faint, evenly curved darker bands through centre of wing, from costa to inner margin; the two inner bands parallel, the two outer bands thickening and diverging towards costa.

Underside
As above, but hw bands more diffuse and irregular, some dark speckling in discal and marginal areas of hw; pale speckling at costa of fw more pronounced.
Measurements: fw, base to apex, 13 mm..
Genitalia: lightly and uniformly chitinised; uncus short, broad proximally, narrow distally, ending in a blunt point; valve pointed apically, broad at base, without median constriction; aedeagus armed apically with a long, narrow, heavily chitinised serrated flange; vesica armed with two unequal heavily chitinised crescent-shaped cornuti.

FEMALE
Unknown.

Holotype ♂: Opala, Lomami River, Prov. Orientale, Congo ex-Belge, III-1959, R.H. Carcasson, to be deposited in British Museum (Natural History).

XENIMPIA LOILE sp. nov. (Ennominae) (Figs. 7,53)

Allied to X. angustata Prout, but fw more falcate, vein 2 of fw more produced at margin, vein 7 of hw less so.

MALE
Antennae and head: light buffish brown (wood brown R).
Thorax: tegulae, base of patagia, anterior part of dorsum buffy brown (R) speckled with dark scales; a pale buff transverse band across middle of patagia and dorsum; remainder of thorax above and below and legs buffy brown (R), speckled with dark scales.
Abdomen: buffy brown (R) speckled with dark scales above, darker below and laterally.

Upperside
Forewing: buffy brown (R) more or less irrorated with blackish scales; costa speckled with light buff, particularly near base; a diffuse, irregular, very pale buff triangular marking with apex near base of cellule 2 and base resting on inner margin; a diffuse blackish fascia from vein 2, across base of cellule 3, to cellule 4, gradually attenuated towards apex of wing; a similar fascia from tornus to cellule 2; cilia and terminal area of cellule 2 paler and more rufous (sayal brown R).

Hindwing: buffy brown, more uniformly and more densely speckled with blackish scales, particularly near termen; cilia sayal brown (R).

Underside
Similar to above, but triangle paler and adjoining black fascia more prominet, cilia of both wings paler, costa of both wings speckled with pale buff.
Measurements: fw, base to apex 17 mm..
Genitalia: uncus long and narrow, bilobed basally; apex and costa of valves lightly chitinised and irregular; a long narrow process projecting upwards from costa near base; ventral margin of valve armed with a brush of dense spines near apex and with fewer, longer spines towards base; aedeagus armed apically with an irregular, heavily chitinised serrated ridge; vesica armed with a double tubular structure, the tubes united basally and furnished with whorls of regular teeth apically.

FEMALE
Unknown.

Holotype ♂: Loile River, Ikela, Equateur, Congo ex-Belge, IV-1959, R.H. Carcasson, to be deposited in British Museum (Natural History).

XENIMPIA BURGESSI sp. nov. (Ennominae) (Figs. 8,49)

Allied to X. misogina Carcasson, but differs in having a more indented margin and a deeper, more brownish ground colour.

MALE
Antennae, head body and legs: beige lightly speckled with black; a darker transverse band across base of patagia and anterior part of thorax.

Upperside
Forewing: ground colour beige lightly speckled with dark scales; a narrow dark line from middle of costa to inner margin at ¼ from base; an irregular dark line from origin of vein 5 to middle of inner margin, the area enclosed by these two lines more heavily irrorated with dark scales and suffused with buff; an irregular faint dark line from origin of vein 3 to inner margin at ⅔ from base; a diffuse, irregular dark submarginal line from apex to inner margin near tornus; apical area more heavily suffused with dark scales.

Hindwing: uniform beige, lightly sprinkled with dark scales.

Underside
Similar to above, but paler; a warm buff spot enclosed by a blackish line from base of veins 2 and 3 of fw to middle of inner margin; a faint buff spot at end of hw cell continued by a faint irregular dark line which almost reaches inner margin.
Measurements: fw, base to apex 16 mm..
Genitalia: uncus laterally compressed, sickle shaped and basally constricted; falces almost as long as uncus; valve broad and short with very blunt, lightly chitinised apex; aedeagus slender, terminating in one short and two long pointed processes.

FEMALE
Unknown.

Holotype ♂: Kinikizi County, Kigezi district, S-W Uganda, XII-1952, J.A. Burgess, to be deposited in British Museum (Natural History).

MIANTOCHORA GRISEATA sp. nov. (Ennominae) (Figs. 15,16,36,52)

Allied to M. fletcheri Herbulot, but differs in being greyer and in lacking the dark dots on the veins at the postmedial band of fw.

MALE
Antennae, head, body and legs: olive grey (citrine-drab R).

Upperside
Forewing: citrine-drab (R) lightly speckled with darker grey; a dark transverse streak closes discoidal cell; postmedial band paler than ground colour, narrow and very regular, slightly convex; postdiscal area irregularly mottled with pale grey, particularly from tornus to vein 5 where pale colour reaches margin; apex somewhat obtuse, termen produced at end of vein 4, no internervular indentations; cilia uniformly grey-brown.

Hindwing: postmedial band paler and broader than in fw, very straight from apex to just above tornus; area distal to postmedial

citrine-drab (R), proximal area paler; end of vein 3 projecting and giving wing a quadrate shape; slight internervular indentations; cilia uniformly grey brown.

Underside
Ground colour grey, paler than above, irrorated with dark grey, particularly near base; dark grey streaks at end of cell in both wings; postmedial line replaced by a complete series of regular dark grey nervular spots in both wings; a very faint, irregular subterminal fascia in both wings.
Measurements: fw, base to apex, 21-22 mm..
Genitalia: uncus short, smooth and blunt; valves unequal, the right valve being longer than the left; valve long and narrow; apical lobe densely spinose, costa armed with long, delicate spines; aedeagus long, armed apically with numerous minute chitinous tubercles.

FEMALE
Fw apex more acute, hw more rounded; ground colour above paler; postmedial band faint; streaks at end of cell absent; faint antemedial and medial fasciae above; sometimes a diffuse but prominent dark spot in distal part of cellule 5 of fw above and one above origin of veins 5 and 6; below paler, postmedial as in male, medial faintly indicated, a prominent dark grey streak from base of cellule 2 to inner margin; some dark submarginal mottling in cellules 6 and 7 above and below.
Measurements: fw, base to apex, 26-29 mm..
Genitalia: ovopositor lobes very elongated; signum small, pear shaped.

Holotype ♂: Mabira Forest, Jinja, Uganda, X-1962, R.H. Carcasson.
Allotype ♀: Kiganjo, Mt. Kenya, Kenya, VII-1960, M. Moore.
♂ Paratypes: 3, same data as Holotype.
One ♀ Paratype: Bwamba, Toro, Uganda, V-1958, R.H. Carcasson.
Holotype and Allotype to be deposited in British Museum (Natural History) Paratypes in Coryndon Museum, Nairobi.

MESOTHISA SUBSTIGMATA sp. nov. (Ennominae) (Figs. 20,21,40,41)

Allied to M. gracilinea Warren, but differs in the subterminal line of the hw being placed nearer the base, in the ground colour above being darker and brighter and in the much brighter and more variegated underside.

MALE
Antennae: shaft pinkish buff (R) at base, speckled with dark brown distally; pectinations pinkish buff, but darker than shaft.
Head: vertex and frons pale pinkish buff, palpi darker (clay color R).
Thorax: pale pinkish buff above, with two dark brown spots near posterior end of dorsum; orange buff (clay color R) speckled with dark brown below.
Legs: femora clay color (R) speckled with dark brown, tibiae and tarsi somewhat darker.
Abdomen: pale pinkish buff above with two dark brown dorsal spots near base; below, clay color, speckled with brown.

Upperside
Forewing: ground colour pinkish buff (R) sparsely and irregularly speckled with dark brown scales; five evenly spaced, irregular dark brown spots at costa, the first, third and fourth from base coinciding with the beginning of the antemedial, postmedial and subterminal lines;

dark antemedial line narrow and irregular, strongly convex distad in cell and in cellule 1b, reaching inner margin at ⅓ from base; subterminal line as above, but more or less parallel with termen, except at vein 7, where it is sharply elbowed distad; postmedial line very faint, parallel with subterminal from costa to vein 3, thence converging towards subterminal and not reaching inner margin; two diffuse and very faint transverse fasciae between subterminal and antemedial from cubitus to inner margin; a prominent dark brown spot at end of cell; a larger submarginal dark spot at vein 4 and a small one at vein 3; apex of wing very acute, end of vein 4 strongly produced; cilia entirely brown at ends of veins, proximally white between ends of veins.

Hindwing: ground colour as above, paler near costa; subterminal line of fw continued straight across hw, reaching inner margin just above tornus; a dark spot surrounded by a rounded pale area at end of cell; the dark fasciae of fw continued across hw, but only clearly discernible near inner margin; a few dark brown scales, forming small irregular spots at veins 3 and 4; cilia as in fw, vein 4 strongly produced, forming a short tail.

Underside

Ground colour bright orange buff (clay color R) densely irrorated with brown scales; markings as above, but much more clearly defined; spots at end of cell in both wings nearly black and surrounded by prominent whitish areas; postmedial edged distally with pinkish scale in both wings; two diffuse, pinkish subterminal spots in cellules 2 and 3 of fw; a diffuse, very irregular pale submarginal band edged proximally with darker scales in hw.

Measurements: fw, base to apex 20 mm..

Genitalia: uncus short and stout. pointed, covered ventrally with minute tubercles; valve with inward projecting subapical process armed with dense short spines; aedeagus short, pointed apically; vesica armed with two series of heavily chitinised spines and a single larger spine.

FEMALE

Antennal pectinations very short; rather larger than male, more densely irrorated with brown scales above and below and therefore darker; diffuse medial fasciae more prominent in both wings above and below.

Measurements: fw, base to apex 23 mm..

Genitalia: signum absent; ductus bursae wide, strongly chitinised and striated.

Holotype ♂: Mpanga Forest, Mpigi, Uganda, XII-1959, T.H.E. Jackson.
Allotype ♀: Bwamba Forest, Toro, Uganda, V-1958, R.H. Carcasson.
Holotype and Allotype to be deposited in British Museum (Natural History)
♂ Paratypes: 2, same data as Allotype
" 1, Katera, Sango Bay, Masaka, Uganda, X-1960 R.H.Carcasson.
" 2, Mabira Forest, Jinja, Uganda, X-1962, R.H. Carcasson
" 1, 20 miles west of Kampala, Uganda, V-1962, E.C.G. Pinhey
" 1, Opala, Lomami River, Congo ex-Belge, III-1959, R.H. Carcasson.
Paratypes in Coryndon Museum, Nairobi.

MESOTHISA PULVERATA sp. nov. (Ennominae) (Figs. 22,23,43)

Allied to M. substigmata Carcasson, and to M. gracilinea Warren, but differs in the subterminal line being strongly crenulated in both wings.

MALE
Antennae: shaft and pectinations very pale buffish yellow, almost white (tilleul-buff R).
Head: vertex and frons ivory yellow, palpi cinnamon buff (R).
Thorax: tilleul-buff (R), speckled and spotted with brown above; orange buff (clay color R) below, more or less speckled with brown.
Legs: cinnamon buff (R) speckled with brown.
Abdomen: tilleul-buff (R) above, speckled and spotted with brown, orange buff (clay color R) below, more or less speckled with brown; anal tuft brown.

Upperside
Forewing: ground colour tilleul-buff (R), sparsely speckled with brown scales and more or less mottled with vinaceous-buff (R); three irregular brown costal spots at extremity of antemedial, postmedial and subterminal lines; antemedial line faint, irregular and incomplete, showing mainly near vein 1, cubitus and radius, followed distally by a very indistinct vinaceous-buff (R) transverse fascia; postmedial line almost obsolete and vaguely indicated in some specimens by a diffuse, very pale fascia; subterminal line narrow but well defined, strongly indented towards margin at veins, emphasized by a dark dot at each vein; a small, but distinct dark dot at end of cell and a series of small brown spots near termen at veins 1,2,3 and 4, the largest at 4; cilia mainly pale brown, mixed with white in internervular spaces; apex acute, end of vein 4 produced into a sharp point.

Hindwing: ground colour as above, outer marginal area darker; antemedial and postmedial fasciae more distinct than in fw; dark spot at end of cell distinct, but smaller than in fw, almost absent in some specimens; subterminal line as in fw, but more distinct, less strongly indented at veins; traces of brown spots at veins, near margin; cilia darker than in fw; margin produced into sharp points at veins 5 and 6, into a short tail at vein 4 and straight from vein 4 to tornus.

Underside
Ground colour ivory yellow (R), heavily mottled and suffused with orange brown (orange cinnamon R) in fw and with purple brown (army brown R) in hw; dark spots at end of cell in both wings surrounded by prominent white areas; postmedial line well defined in fw, meeting subterminal at inner margin, edged distally with prominent silvery white internervular lunules; subterminal line of hw edged distally with pale pinkish brown; a similar, though somewhat more diffuse dark line parallel and distal to subterminal, also edged distally with pinkish brown.
Measurements: fw, base to apex, 22 mm..
Genitalia: very similar to M. substigmata Carcasson, but subapical spinose process of valve smaller; aedeagus stouter; vesica armed with a series of spines arranged as in a brush; single large spine absent.

FEMALE
Similar to male but larger, antennae not pectinated, underside paler, less distinctly marked; abdomen missing in ♀ Allotype.
Measurements: fw, base to apex, 24 mm..

Holotype ♂: Kayonza, Kigezi district, S.W. Uganda, V-VI-1957, T.H.E. Jackson.
Allotype ♀: 20 miles west of Kampala, Uganda, V-1952, E.C.G. Pinhey.
♂ Paratypes: 2, same data as Holotype.
" : 1, Mabira Forest, Jinja, Uganda, X-1962, R.H. Carcasson.
Holotype and Allotype to be deposited in British Museum (Natural History)

Paratypes in Coryndon Museum, Nairobi.

MESOTHISA CINNAMONEA sp. nov. (Ennominae) (Figs. 19,42)

MALE
Antennae: shaft dirty white, speckled with very pale brown; pectinations pale brown.
Head: vertex dirty white, frons vinaceous buff (R), speckled with brown; palpi pale greyish brown.
Thorax: pale pinkish white (tilleul-buff R) speckled with brown above, cinnamon (R) below.
Legs: cinnamon, speckled with dark scales.
Abdomen: pale brown speckled with dark brown above; four large, prominent dark dorsal spots; pale cinnamon below, speckled with brown.

Upperside
Forewing: ground colour light vinaceous cinnamon (fawn color R), heavily speckled with grey at costa and apex, lightly elsewhere; costa suffused with grey and white from base to antemedial band; antemedial broad, evenly arched, diffuse at edges, mainly black distally, grey and white proximally; a prominent black dot at end of cell; subterminal line placed more proximally than in other species, consisting of a regular series of pale grey internervular triangles lightly speckled with black at margins, with apices pointing outwards and terminating in a black costal spot near apex of wing; apex acute, but termen more regular than in preceeding species; end of vein 4 only slightly produced; cilia mostly grey mixed with white, darker at ends of veins.

Hindwing: ground colour fawn color (R), paler near costa, more heavily speckled than in fw; an irregular, diffuse, grey antemedial fascia; subterminal (? postmedial) very indistict from costa to vein 5, more clearly defined, strongly crenulated, black proximally, grey and white distally, from vein 5 to inner margin; marginal area from tornus to vein 5 pale grey, speckled with dark scales; a short, narrow, irregular blackish line from tornus to vein 5, parallel and distal to subterminal; termen straight from apex to end of vein 4 which is slightly produced; slight internervular indentations from vein 4 to tornus; cilia fawn (R) from costa to vein 4, dark grey with whitish margins from vein 4 to tornus.

Underside
Ground colour as above, but somewhat brighter (cinnamon R), more densely speckled with black scales; markins as above, but antemedial more irregular, entirely blackish grey in both wings; subterminal (? postmedial) as above and equally distinct from costa to inner margin of hw, but less distinct in fw; apex of fw blackish, two blackish submarginal dots in cellule 4 of fw, forming part of a vague, narrow irregular submarginal grey line reaching vein 1; submarginal line of hw more indistinct than above, reaching apex of wing in some specimens and incorporating three black dots at veins 2,3 and 4; a prominent black spot at end of cell.

Measurements: fw, base to apex, 22 mm..
Genitalia: uncus short, smooth, with rounded apex; valve trilobed, the median lobe (apex) rounded and membranous; upper and lower lobes heavily chitinised, falcate and armed with minute teeth; aedeagus long and slender, armed apically with a single series of long parallel spines.

FEMALE
Unknown.

Holotype ♂: Kalinzu Forest, Ankole, Uganda, XI-1961, R.H. Carcasson, to be deposited in British Museum (Natural History).
♂ Paratypes: 3, same data as Holotype.
" : 2, Kayonza, Kigezi district, S.W. Uganda, V-VI-1957, T.H.E. Jackson. Paratypes in Coryndon Museum, Nairobi.

GEOLYCES SYLVANA sp. nov. (Ennominae) (Figs.18,54)

MALE
Antennae, head and thoracic collar: snuff brown (R); remainder of thorax and abdomen: cinnamon (R) above, paler below.
Legs: cinnamon, speckled with brown.

Upperside
Forewing: cinnamon (R) speckled with black scales and mottled with greyish, particularly near costa, in subapical area and in area distal to discoidal cell; costa brown near base and heavily irrorated with dark brown elsewhere; indistinct, irregular antemedial and medial fasciae, the latter culminating in a diffuse brick-red square spot at end of cell; a more or less complete postmedial series of black dots from base of vein 7, sometimes to vein 1; two white submarginal lunules edged distally with dark grey in cellules 7 and 8, near apex; apical area distal to white lunules and cellules 2,3 and 4 brighter cinnamon than elsewhere; termen strongly convex at end of vein 6.

Hindwing: ground colour as in fw, more greyish near costa, mottled with pale ochreous near inner margin; postdiscal and marginal areas darker; postmedial series of black nervular dots complete and more conspicuous than in fw, edged distally with white scales; inner margin speckled with black; termen indented between veins, vein 3 prolonged into a short tail.

Underside
Forewing: paler than above, but similarly marked; brick red spot at end of cell very conspicuous; marginal portion of cellules 7 and 8 (outside white lunules) bright brick red, mottled proximally with blackish; distal ⅔ of cellule 6 light brick mottled with ochre, conspicuously blackish proximally.

Hindwing: cinnamon (R) irrorated with black and mottled with bright brick red; an irregular, large, conspicuous pale ochreous area near inner margin.
Measurements: fw, base to apex, 20-21 mm..
Genitalia: uncus very short, blunt and hairy; valve long, narrow and bilobed; upper lobe apically rounded and armed with numerous long slender spines; lower lobe narrow, pointed and terminating in a cluster of short teeth; a sharp pointed hook projecting inwards from centre of valve (harpe); aedeagus short, terminating in two long sinuous chitinised spines.

FEMALE
Unknown.

Holotype ♂: Kalinzu Forest, Ankole, Uganda, XI-1961, R.H. Carcasson, to be deposited in British Museum (Natural History).
♂ Paratypes: 6, same data as Holotype.
" : 1, Malaba Forest, Kakamega, Kenya, VI- 1957, C.R. Howard.
" : 1, Opala, Lomami River, Prov. Orientale, Congo ex-Belge, III-1959, R.H. Carcasson.
Paratypes in Coryndon Museum, Nairobi.

HYPOSIDRA NEGLECTA sp. nov. (Ennominae) (Figs. 17,44)

Closely allied to H. smithi Warren, but differs in having no black markings and a less indented margin.

MALE
Antennae: shaft pale buffy brown (R), pectinations darker.
Head: vertex and upper part of frons pale buffy brown, lower part of frons and palpi darker brown.
Thorax, legs and abdomen: pale buffy brown (R).

Upperside
Pale buffy brown (R), irrorated and mottled with darker brown; costa of fw pale ochreous; a diffuse dark subapical spot at costa of fw; traces of an indistinct dark postmedial line from costa to base of vein 5.

Underside
As above, but paler; dark markings reduced or absent.
Measurements: fw, base to apex, 16-19 mm..
Genitalia: uncus short, very broad at base, tapering to a fine point; valve long, very narrow distally; a stout harpe near base of valve, armed with several strong, long, slightly curved spines; aedeagus short, almost membraneous, with a small chitinous apical plate.

FEMALE
Unknown.

Holotype ♂: Kalinzu Forest, Ankole, Uganda, XI-1961, R.H. Carcasson, to be deposited in British Museum (Natural History).
♂ Paratypes: 7, same data as Holotype.
" : 3, Mabira Forest, Jinja, Uganda, X-1962, R.H. Carcasson.
Paratypes in Coryndon Museum, Nairobi.

DASYMACARIA PLEBEIA sp. nov. (Ennominae) (Figs. 24,25,39,46)

MALE
Antennae: shaft light brownish buff, speckled with darker scales; pectinations darker and somewhat shorter than in D. ansorgei Warren.
Head, body and legs: light brownish buff more or less speckled with darker hairs and scales.

Upperside
Forewing: ground colour light brownish buff, speckled with darker scales; costa darker at base and irregularly spotted with light brown throughout its length; an indistinct narrow medial band from costa

to just below cubitus; dark postmedial line narrow and distinct, strongly curved distad from costa to vein 3, slightly curved proximad from vein 3 to inner margin; marginal areas distal to postmedial more heavily irrorated with brown; a small reddish brown apical dot; two small blackish subterminal dots, one in cellule 4 and one in 5. termen narrowly blackish from vein 7 to vein 4; apex falcate, termen concave from apex to vein 4.

Hindwing: ground colour light brownish buff, uniformly speckled with darker scales; a small indistinct dark dot at end of cell; postmedial line narrow and somewhat indistinct, parallel to termen; end of vein 3 slightly prolonged.

Underside

As above, but more heavily and more uniformly speckled; dark spots less prominent; an indistinct and incomplete dark antemedial band in both wings; both curves of postmedial line in fw bisected by a straight diagonal line; postmedial line of hw double and enclosing an irregular oval area in cellules 4 and 5.
Measurements: fw, base to apex, 17 mm..
Genitalia: distal portion of uncus laterally compressed, terminating in a hook; valve rounded apically and spinose; harpe terminating in a sharp, stout, inwardly directed spine; aedeagus short and stout.

FEMALE
Antennae: not pectinated.

Very much larger than ♂; marginal indentations more pronounced, dark markings more prominent; basal area of fw above darker, enclosed by a distinct antemedial line; medial line of fw above more diffuse than in ♂.
Measurements: fw, base to apex, 25 mm..
Genitalia: signum small and irregular, without teeth or spines; ovopositor lobes very long and slender.

Holotype ♂: 20 miles west of Kampala, Uganda, III-1952, E.C.G. Pinhey.
Allotype ♀: Bena Dibele, Sankuru, Kasai, Congo ex-Belge, IV-1959, R.H. Carcasson; Allotype and Holotype to be deposited in British Museum (Natural History).

SEMIOTHISA FITZGERALDI sp. nov. (Ennominae) (Figs. 12,50)

MALE
Antennae: black, speckled with white.
Head: vertex and frons white speckled with black; palpi white below, then speckled with black; apices black.
Thorax: tegulae blackish; patagia and dorsum greyish white; below white.
Legs: white, speckled with black; anterior coxae prominently black.
Abdomen: greyish white speckled with black above, white below.

Upperside

Forewing: ground colour greyish white, more or less irrorated with grey and blackish grey; costa black from base to antemedial with some white striations, white with black striations from antemedial to medial, black at medial, white, striated with black from medial to postmedial with a triangular black mark just before postmedial, black at postmedial, white striated with black at apex; antemedial line narrow, blackish and somewhat indistinct; medial broader and more distinct, strongly elbowed distad in cell; postmedial very broad, dark

grey, somewhat angled near apex, then straight to tornus; a blackish grey marginal area from vein 4 to vein 7, merging with postmedial; a white apical spot, striated with black, at costa; cilia irregularly chequered, black and white.

Hindwing: ground colour as above; antemedial broader, but paler than in fw; medial absent; postmedial very broad and irregular, dark grey, invading outer margin from apex to vein 4 and from vein 2 to tornus; cilia irregularly chequered, black and white.

Underside
As above, but ground colour whiter and dark markings darker, particularly in hw where antemedial and postmedial are black and medial is indicated by a black streak near costa.
Measurements: fw, base to apex, 16-17 mm..
Genitalia: uncus with two long, strongly chitinised terminal spines; gnathos with a stout terminal point curling upwards; valve long with a deep ventral emargination; aedeagus slender and moderately long; vesica armed with two slender, strongly chitinised serrated processes.

FEMALE
Unknown.

Holotype ♂: Abercorn, Northern Rhodesia, XI-1963, D. Vesey-FitzGerald, to be deposited in British Museum (Natural History).
♂ Paratypes: 3, same locality as Holotype, one collected by D. Vesey-FitzGerald, two by E.S. Brown, in Coryndon Museum, Nairobi.

GEODENA PRINGLEI sp. nov. (Ennominae) (Figs. 26,27,55,56)

MALE
Antennae: black, pectinations long and slender, widely spaced.
Head: vertex and frons light orange yellow (R); palpi light orange yellow tipped with black.
Thorax: light buff yellow (maize yellow R).
Legs: femora maize yellow (R), fore and mid tibiae and tarsi pale olive brown, hind tibiae and tarsi maize yellow.
Abdomen: maize yellow (R).

Upperside
Forewing: ground colour maize yellow (R); basal ⅓ to ½ of costa narrowly black; a short black diagonal bar at end of cell.

Hindwing: ground colour maize yellow (R); a black oval spot at end of cell.

Underside
Similar to upperside.
Measurements: fw, base to apex, 15-17 mm..
Genitalia: uncus spoon shaped; gnathos strongly chitinised apically terminating in 4-5 stout spines; valve furnished with a very long slender harpe terminating in a hook; aedeagus terminating in two long, slender spines; vesica armed with numerous spines.

FEMALE
Similar to male, but larger and brighter yellow.
Measurements: fw, base to apex, 16-19 mm..
Genitalia: bursa small and without signum; ductus bursae long, stout, well chitinised and spirally fluted.

Holotype ♂: Amani, E. Usambara, Tanganyika, III-1962, G. Pringle.
Allotype ♀: Amani, E. Usambara, Tanganyika, II-1962, G. Pringle.
Holotype and Allotype to be deposited in British Museum (Natural History).
Paratypes: 4 ♂♂, 6 ♀♀, same locality and collector as above, in Coryndon Museum, Nairobi.

NEOPITTHEA genus novum (Geometridae, Ennominae)

MALE

Proboscis well developed; palpi long and slender, pointing upwards, fringed below at base with long hairs; frons flat, without tuft; eyes protruberant; antennae with two series of long ciliated pectinations. Fore tibia with a pointed process slightly longer than tibia; terminal spurs of mid tibia short, stout and sharply pointed; hind tibia not dilated and without hair pencil; median and terminal spurs short, stout and sharply pointed. Forewing triangular and elongated, costa very slightly arched, apex obtuse, termen slightly curved; R1 free, arising just before end of cell, R2 anastomosed with R3, forming an areole; R3 arising from end of cell; R3, R4 and R5 on a common stalk; M1 arising from upper angle of DC, contiguously to R3, M2 from just above lower angle of DC. Hindwing regular and evenly curved, without internervular indentations; SC anastomosing with upper median from base to ⅓ of length of discoidal cell; RS and M1 on a short common stalk from upper angle of DC; M2 indicated by a slight non-tubular thickening of the membrane.
Genitalia: tegumen with a median suture, uncus deeply bilobed, valve bilobed, gnathos absent.

FEMALE

Unknown.

It is difficult to assess the exact position of this genus without knowledge of the female, but at present it would appear to be related to the genera Ereunetea, Geodena, Pitthea and Amnemopsyche from which it differs however, in the fusion of SC with the upper median of the hw and in the structure of the genitalia. It differs from the members of the tribe Diptychini in the structure of the antennae and of the genitalia.
Type species: Neopitthea pringlei sp. nov.

NEOPITTHEA PRINGLEI sp. nov. (Figs.29,38,45)

MALE

Antennae: black, with long ciliated pectinations tapering towards apex.
Head: vertex and frons orange; proximal segments of palpi orange, terminal segments black.
Thorax: deep chrome (R) above and below; a large black spot at base of each coxa and of each fw and above hind coxa.
Legs: coxae deep chrome (R), black laterally; femora yellowish internally; tibiae and tarsi blackish.
Abdomen: deep chrome (R), each segment bearing a large black dorsal spot and two smaller black lateral spots.

Upperside

Forewing: ground colour deep chrome (R), costa black; a broad black bar from costa to tornus, wider at both extremities, partly obsolete in some specimens and thus reduced to a black bar from costa to cubitus

and to a black tornal spot; apex black from costa at ¾ from base to vein 6; a large triangular black terminal spot from vein 2 to vein 4; termen between black apical and terminal spots narrowly black.

Hindwing: ground colour deep chrome (R); a black apical spot from costa to vein 7; a black terminal spot in cellule 3, sometimes obsolete; a larger triangular black terminal spot in lc.

Underside
Identical to upperside.
Measurements: fw, base to apex, 19-22 mm..
Genitalia: uncus forked into two long, slender, slightly spatulate processes; lower lobe of valve small and rounded; upper lobe arising from base of costa, very narrow and sinuous, terminally lobed and pointed, reaching apices of uncus; aedeagus slender and of moderate length, vesica unarmed.

Holotype ♂: Amani, E. Usambara, Tanganyika, VII-1961, G. Pringle, to be deposited in British Museum (Natural History).
♂ Paratypes: 4, same locality and collector as Holotype, in Coryndon Museum, Nairobi.

RHODOMETRA SEVASTOPULOI sp. nov. (Geometridae, Larentiinae)
(Figs.28,60,61)

Closely allied to and possibly a subspecies of R. satura Prout, from which it differs in having a narrower marginal band in fw and a white hw.

MALE
Antennae: shaft pinkish, pectinations straw coloured.
Head: vertex, frons and palpi pale yellow.
Thorax: pale yellow.
Legs: coxae pink, femora pinkish externally, pale yellow internally; tibiae and tarsi pale yellow.
Abdomen: creamy white.

Upperside
Forewing: ground colour very pale yellow; costa broadly pink from base to middle; a broad, straight, well defined bright pink bar from apex to middle of inner margin; a broad, well defined, bright pink marginal band from apex to tornus; cilia uniformly pale yellow.

Hindwing: ground colour creamy white; a pale light brown distinct marginal band from apex to tornus; cilia creamy white.

Underside
Ground colour off-white in both wings; pink markings of upperside pale pinkish brown; marginal band of hw paler than above; a very pale brownish spot in centre of cellule 7 of hw.
Measurements: fw, base to apex, 11-12 mm..
Genitalia: almost identical to R.satura Prout.

FEMALE
Antennae: pinkish, thread-like.

Upperside
Forewing: similar to male, but pink markings narrower; hw creamy white without brown marginal band.

Underside
Generally paler than male.
Measurements: fw, base to apex, 10 mm..
Genitalia: signum large, diamond shaped, with median fold; ostium bursae surrounded by a rounded tuft of very fine hairs.

Holotype ♂: Mombasa, Kenya, X-1961, D.G. Sevastopulo.
Allotype ♀: same data as Holotype.
Holotype and Allotype to be deposited in British Museum (Natural History).
♂ Paratypes: 4, same data as Holotype, in Coryndon Museum, Nairobi.

TUERTA ARGYROCHLORA sp. nov. (Agaristidae) (Figs. 30,59)

Closely allied to T. chrysochlora Walker and to T. liturata Aurivillius, but differs in the greater development of the silvery white markings of the fw and in the structure of the genitalia.

MALE
Antennae: black, without apical club.
Head: vertex, frons and palpi very dark purplish brown, almost black, lightly dusted with white; a white tuft at base of each antenna and above each eye, at base of vertex.
Thorax: very dark purplish brown above with a few scattered white hairs and scales, deep chrome (R) below.
Legs: femora deep chrome (R), tibiae and tarsi very pale brownish speckled with dark purplish brown.
Abdomen: orange yellow (capucine yellow R) above with a dark brown dorsal spot on each segment; anal tuft capucine yellow, below uniformly capucine yellow.

Upperside
Forewing: ground colour parrot green (R), costa paler; a large irregular white reniform spot at end of cell; two small white dots in cell, a small white dot at origin of vein 2 and a small white streak in cellule 1b; basal portion of inner margin very dark purple brown; a large dark puple brown spot with darker edges and speckled with white in central part of cellule 1a and extending into lower half of 1b; a very dark brown, almost black, irregularly curved line from costa at ¾ from base to inner margin at ⅔ from base; marginal area distal to dark line dark purplish brown; a faint, wavy, very dark purple brown submarginal band, edged distally with a few white scales, particularly near apex; cilia purple brown.

Hindwing: ground colour capucine yellow (R); a broad brownish black marginal border from apex to tornus, narrowing towards tornus; a faint blackish streak from tornus to middle of inner margin; cilia pale greyish brown; wing adorned with dense long hairs, particularly near inner margin.

Underside
Forewing: basal ⅔ ochreous orange; apical and marginal ⅓ ochreous brown becoming sepia brown towards edge of orange basal area and red brown towards costa and apex.

Hindwing: uniformly ochreous orange with some reddish scales near apex.
Measurements: fw, base to apex, 18-20 mm..
Genitalia: uncus narrow, hairy, somewhat spatulate and ending in a

sharp terminal hook; valve with strongly arched costa and rounded apex; a long, sharp, inwardly directed subapical spine from ventral margin; aedeagus slender, ending in an expanded bilobed knob densely covered by minute spines.

FEMALE
Unknown.

Holotype ♂: Kalinzu Forest, Ankole, Uganda, XI-1961, R.H. Carcasson, to be deposited in British Museum (Nataural History).
♂ Paratypes: 6, same data as Holotype, in Coryndon Museum, Nairobi.

LOPHOSTETHUS NEGUS (Jordan), (Sphingidae, Ambulicinae)

Lophostethus demolini negus Jordan
Nov. zool. 33: 380, fig. 4, (1926)

This form was described by Dr. Karl Jordan from a single ♂ from Kambatta, S.W. Abyssinia. As no specimens of L. demolini Angas were known from Ethiopia, negus was treated as the Ethiopian subspecies of L. demolini by Jordan in the original description and by Hering in Seitz (1927). However, in recent years two males of L. demolini from Ethiopia have been received at the Coryndon Museum (Gojeb River, Gimma, IV-1961, S. Chojnacki and Wonji, Nazareth, Auash River, II-1962, M. Redaigzig), which, apart from being somewhat darker than specimens from eastern and southern Africa and thus approaching the west African race carteri Rothschild, appear reasonably typical.

At the same time two males of negus were also received (Rain forest, 8500 ft., Gara Mullata Mts., 50 km. west of Harar, Ethiopia, XII-1962, R. Hill). These two specimens are quite different from the true demolini, being much smaller, darker, with less elongated fw, less indented termen, with the discal spots of the fw differently shaped and pale yellow instead of white and with differently shaped antemedial and postmedial bands on both sides.

The very different appearance of the two insects, the fact that they occur within 100 km. of one another and the fact that demolini is an inhabitant of Acacia scrub, open woodland and savanna, not usually rising above 5000 ft., whereas negus occurs in montane rain forest at 8500 ft., strongly suggest that negus should be treated as a good species.

ACKNOWLEDGEMENT

The author would like to acknowledge his gratitude to Mr. D.S. Fletcher of the British Museum (Natural History) for assistance in checking the identity of the two specimens of negus and for checking the availability of names used in this paper.

(Received for publication 2nd. May 1964)

EXPLANATION OF PLATES

PLATE I (All figures natural size)

Fig. 1. Pigiopsis aurantiaca ♀
Fig. 2. Pigiopsis ugandana ♂
Fig. 3. Pigiopsis ugandana ♀
Fig. 4. Zamarada opala ♀
Fig. 5. Zamarada opala ♂
Fig. 6. Thenopa pseudonigraria ♂
Fig. 7. Xenimpia loile ♂
Fig. 8. Xenimpia burgessi ♂
Fig. 9. Xenimpia opala ♂
Fig. 10. Sphingomima mabira ♂
Fig. 11. Sphingomima manyara ♂
Fig. 12. Semiothisa fitzgeraldi ♂
Fig. 13. Epigynopteryx jacksoni ♂
Fig. 14. Rhodophthitus pseudabraxas ♂
Fig. 15. Miantochora griseata ♂
Fig. 16. Miantochora griseata ♀

PLATE II (All figures natural size)

Fig. 17. Hyposidra neglecta ♂
Fig. 18. Geolyces sylvana ♂
Fig. 19. Mesothisa cinnamonea ♂
Fig. 20. Mesothisa substigmata ♂
Fig. 21. Mesothisa substigmata ♀
Fig. 22. Mesothisa pulverata ♂
Fig. 23. Mesothisa pulverata ♀
Fig. 24. Dasymacaria plebeia ♂
Fig. 25. Dasymacaria plebeia ♀
Fig. 26. Geodena pringlei ♂
Fig. 27. Geodena pringlei ♀
Fig. 28. Rhodometra sevastopuloi ♂
Fig. 29. Neopitthea pringlei ♂
Fig. 30. Tuerta argyrochlora ♂

PLATE III (Genitalia x 13)

Fig. 31. Sphingomima mabira ♂
Fig. 32. Sphingomima manyara ♂
Fig. 33. Pigiopsis aurantiaca ♀
Fig. 34. Pigiopsis ugandana ♀
Fig. 35. Rhodophthitus pseudabraxas ♂

PLATE IV (Genitalia and Venation)

Fig. 36. Miantochora griseata ♀ x 13
Fig. 37. Thenopa pseudonigraria ♂ x 13
Fig. 38. Neopitthea pringlei (Venation)
Fig. 39. Dasymacaria plebeia ♀ x 13

PLATE V (Genitalia x 20)

Fig. 40. Mesothisa substigmata ♂
Fig. 41. Mesothisa substigmata ♀
Fig. 42. Mesothisa cinnamonea ♂
Fig. 43. Mesothisa pulverata ♂
Fig. 44. Hyposidra neglecta ♂
Fig. 45. Neopitthea pringlei ♂
Fig. 46. Dasymacaria plebeia ♂
Fig. 47. Pigiopsis ugandana ♂
Fig. 48. Epigynopteryx jacksoni ♂

PLATE VI (Genitalia x 20)

Fig. 49. Xenimpia burgessi ♂
Fig. 50. Semiothisa fitzgeraldi ♂
Fig. 51. Xenimpia opala ♂
Fig. 52. Miantochora griseata ♂
Fig. 53. Xenimpia loile ♂
Fig. 54. Geolyces sylvana ♂

PLATE VII (Genitalia x 20)

Fig. 55. Geodena pringlei ♂
Fig. 56. Geodena pringlei ♀
Fig. 57. Zamarada opala ♀
Fig. 58. Zamarada opala ♂

PLATE VIII (Genitalia x 26)

Fig. 59. Tuerta argyrochlora ♂
Fig. 60. Rhodometra sevastopuloi ♂
Fig. 61. Rhodometra sevastopuloi ♀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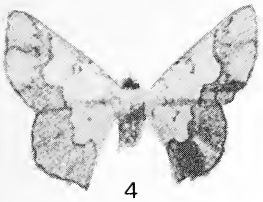
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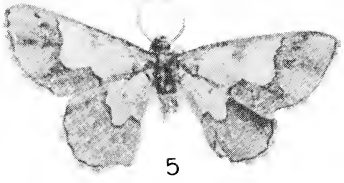
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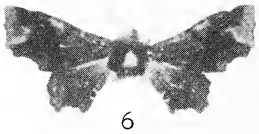
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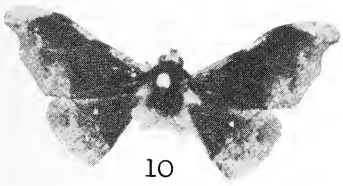
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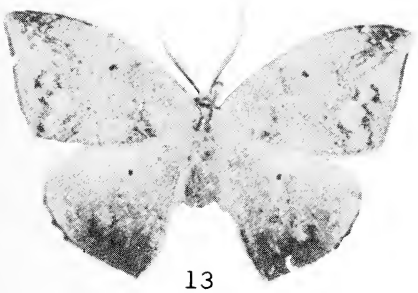
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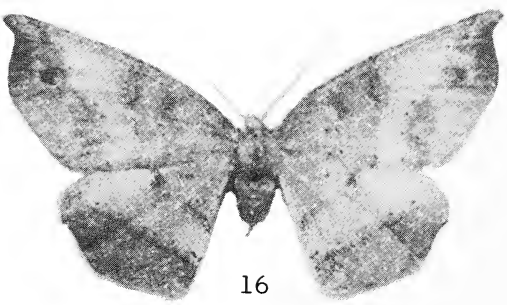
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PLATE I

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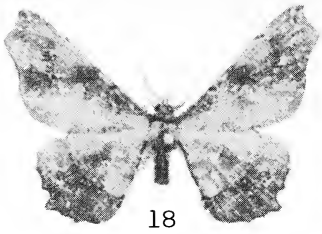

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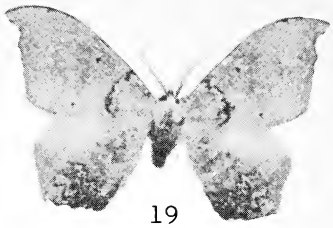

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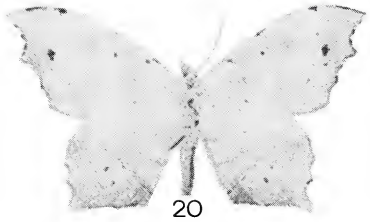

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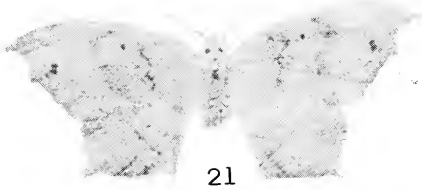

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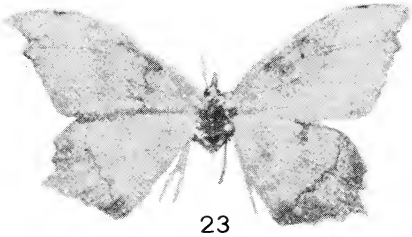

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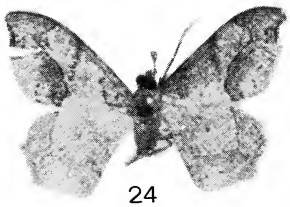

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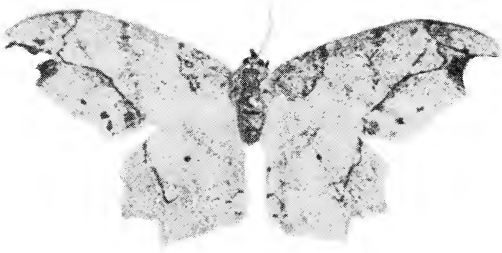

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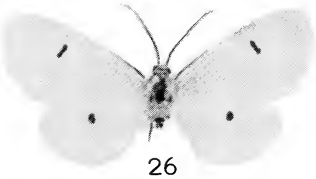

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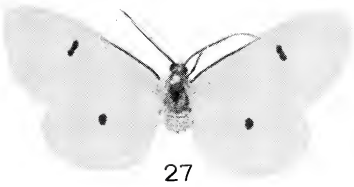

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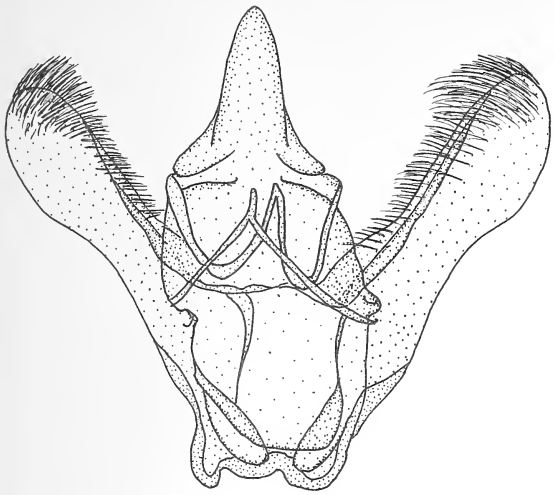

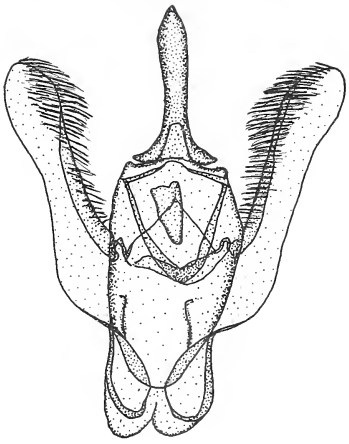

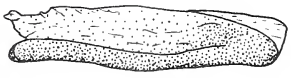

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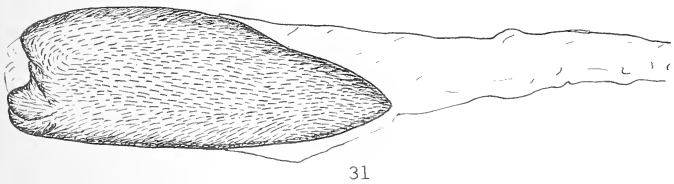

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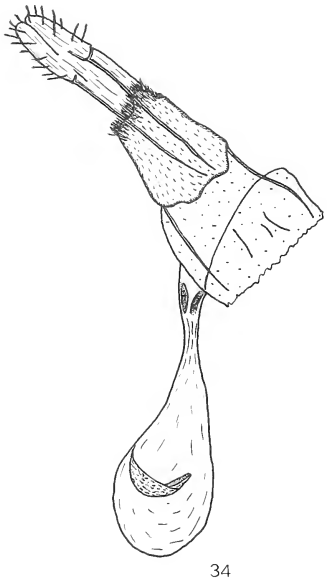

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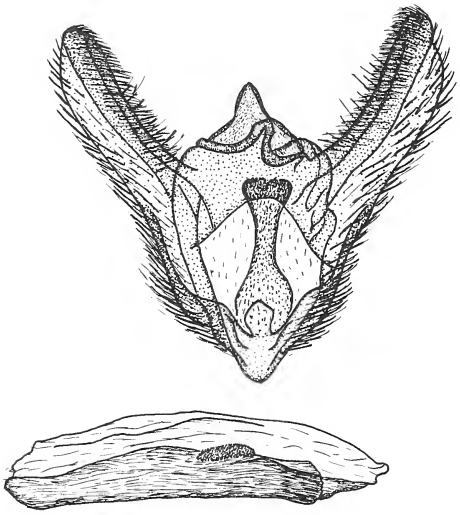

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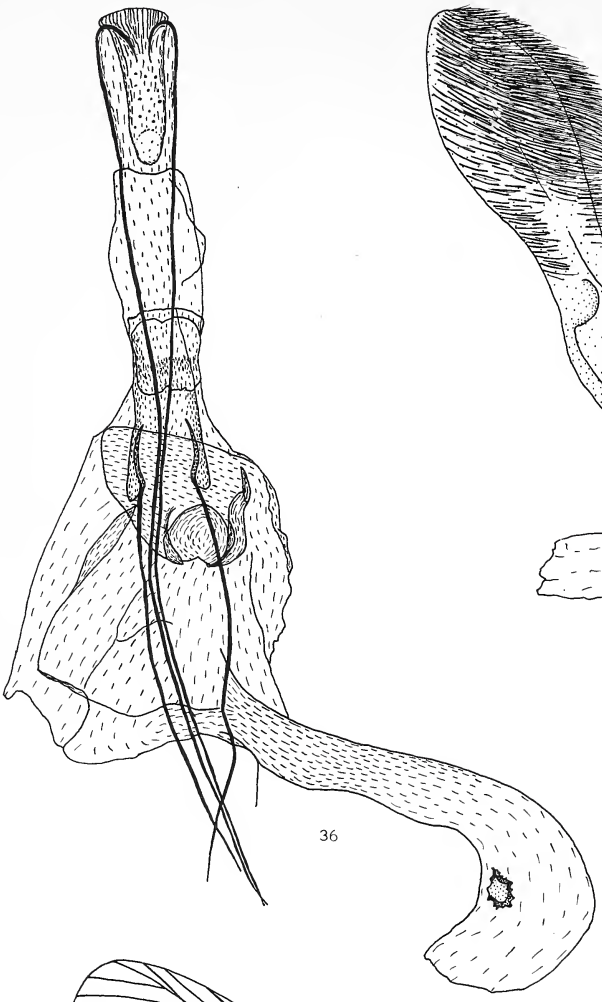

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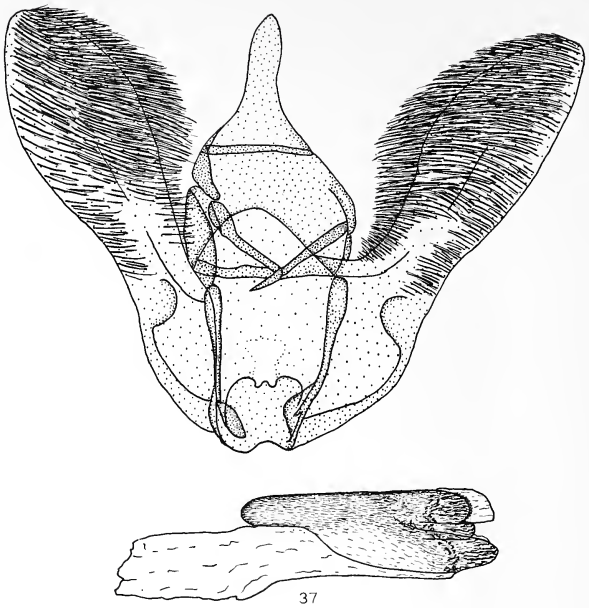

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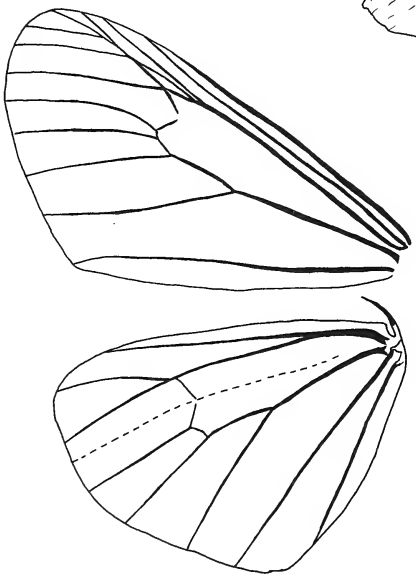

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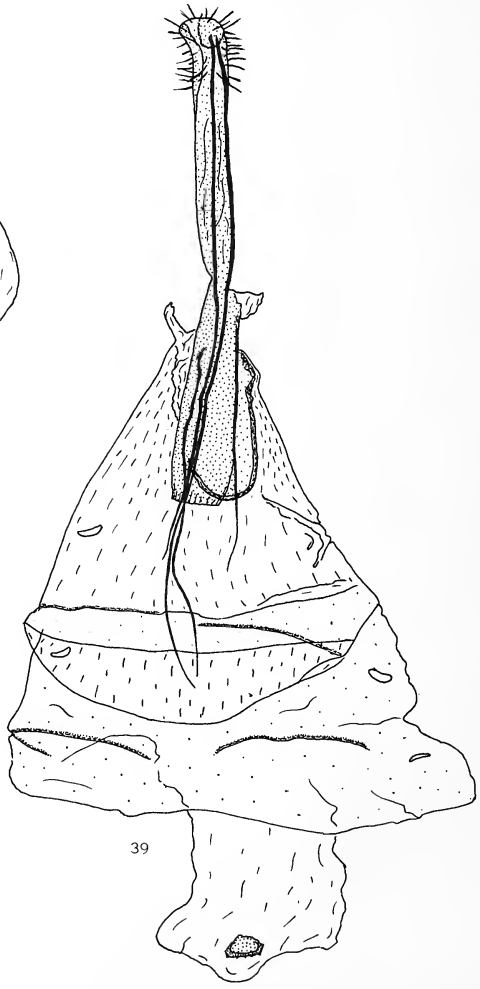

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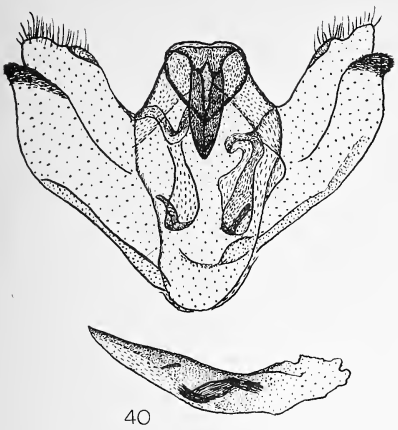

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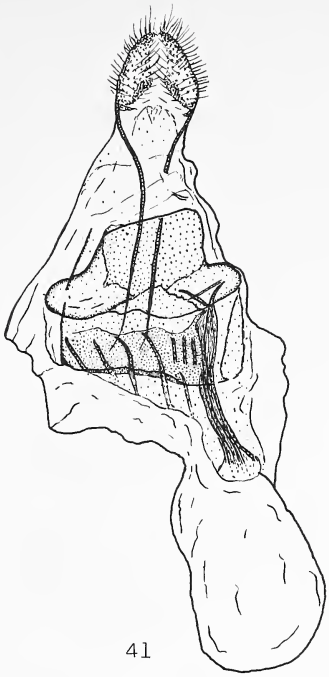

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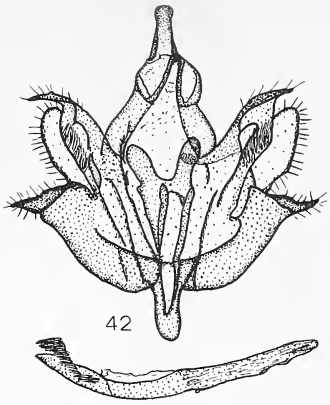

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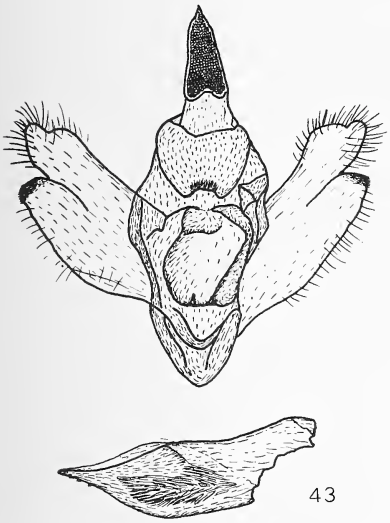

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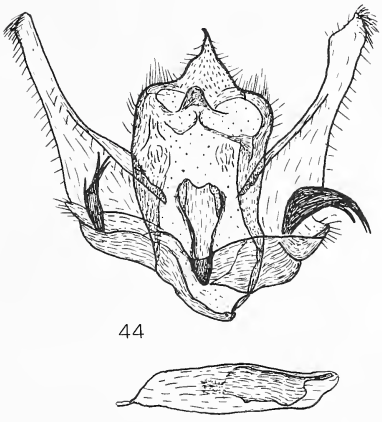

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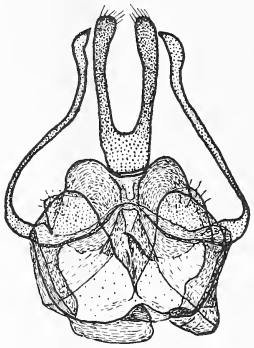

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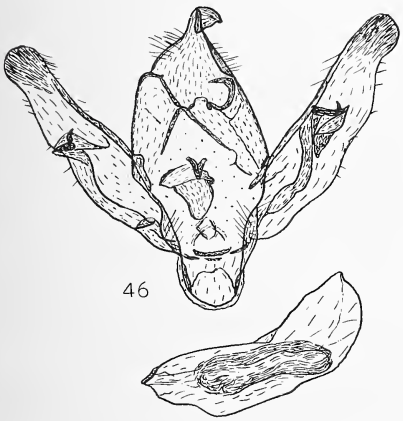

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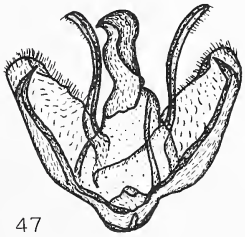

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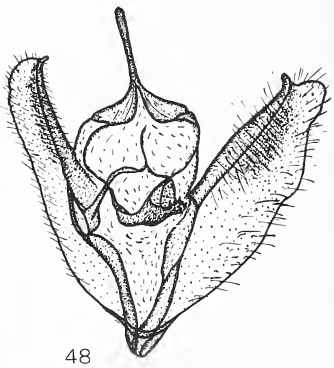

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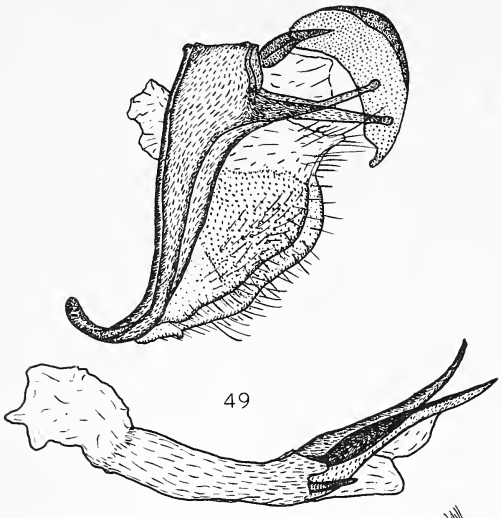

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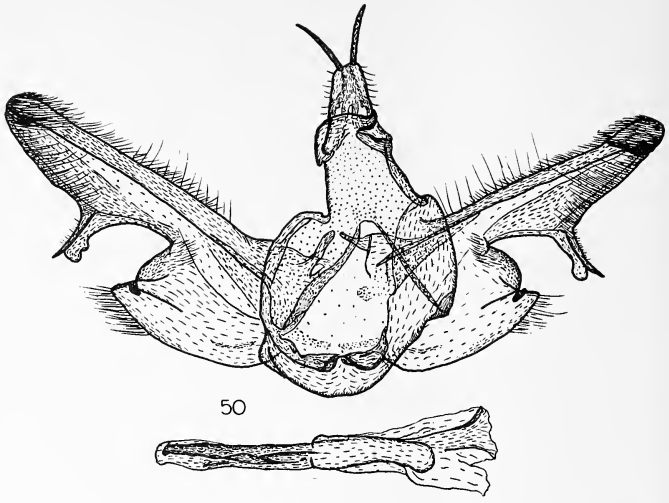

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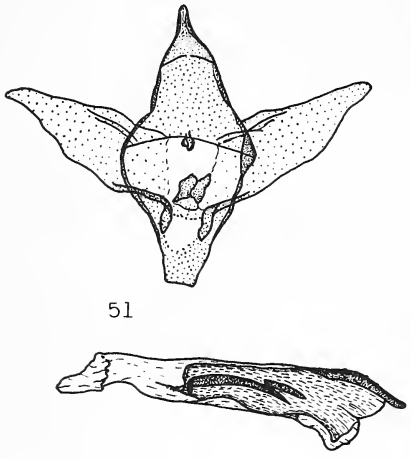

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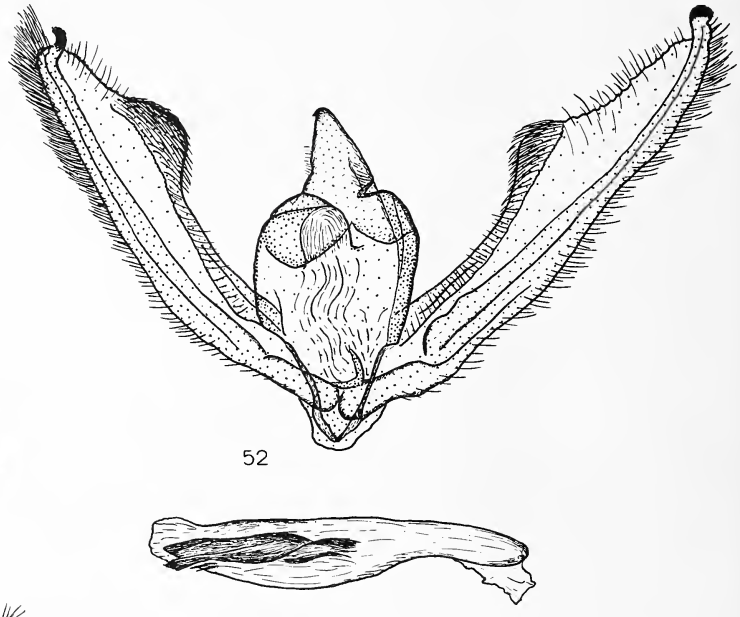

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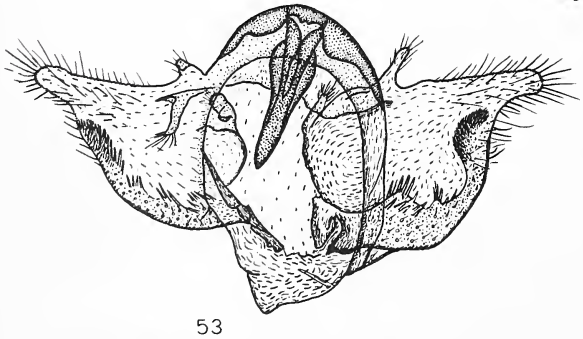

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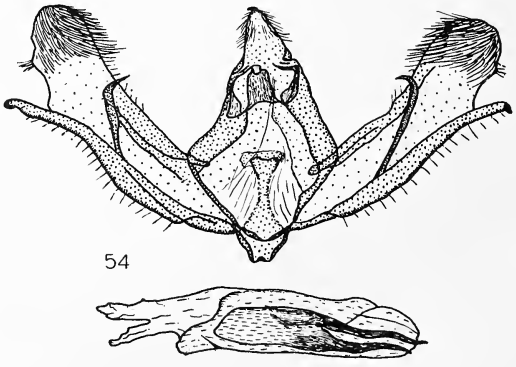

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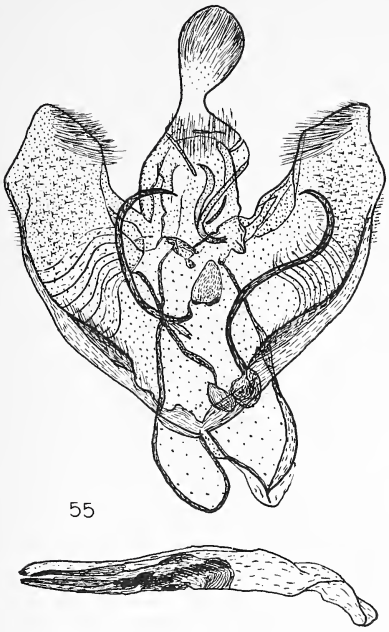

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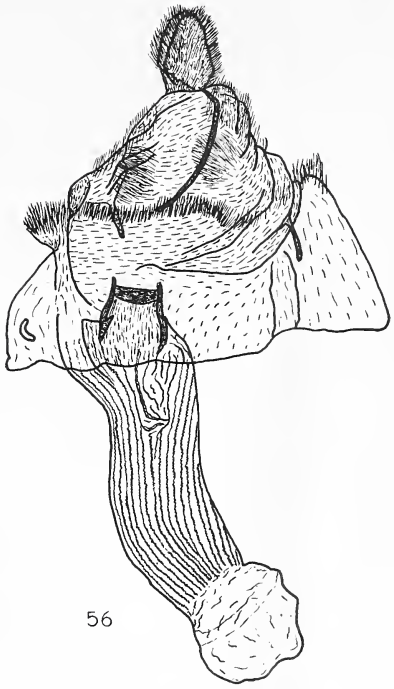

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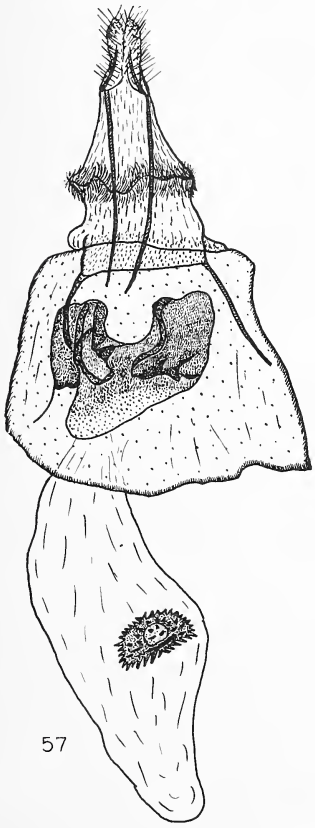

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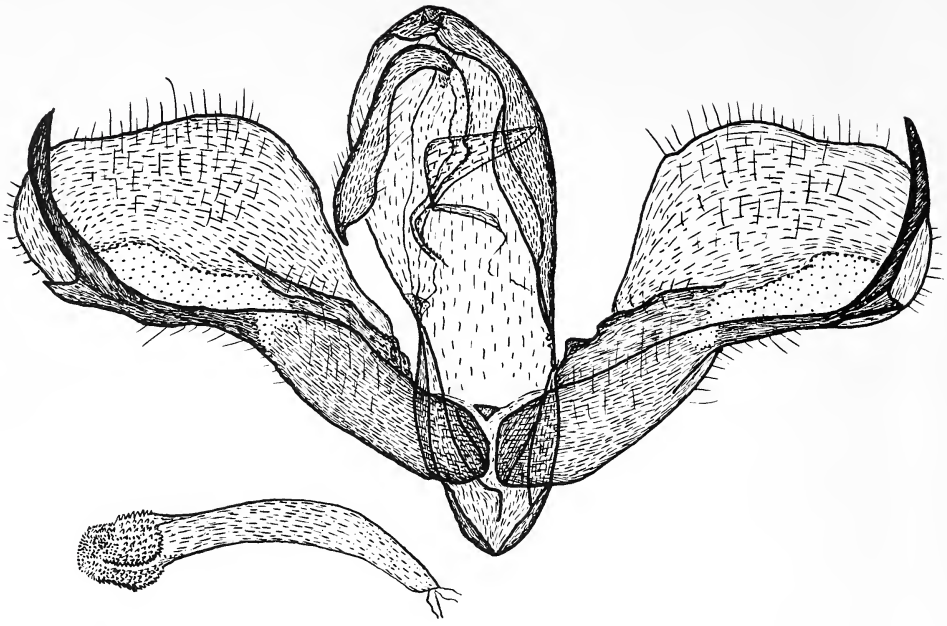
PLATE VII



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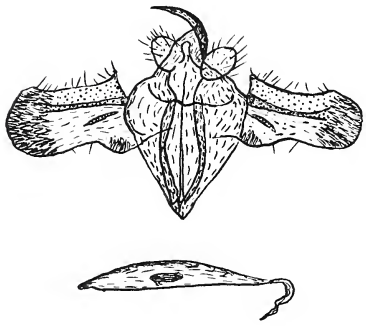

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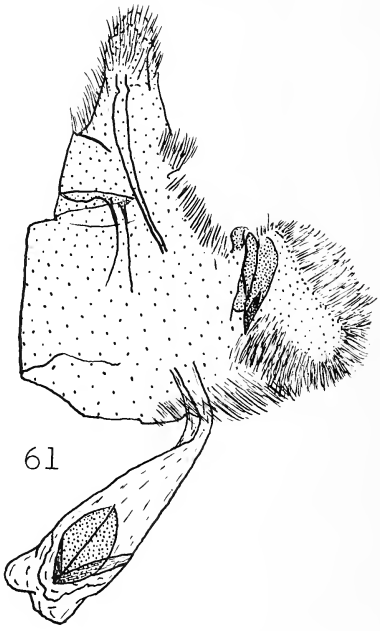

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PLATE VIII

SOME NOTES ON LOVEBIRDS, (Agapornis spp.)

By

J.R.H. EVANS
(Sixth Form, The Delamere School, Nairobi.)

The following observations on the behaviour and breeding of Lovebirds (Agapornis spp.) may be of interest:

The family Psittacidae includes two species of lovebirds resident in Tanganyika - these are Agapornis fischeri Reichenow and A. personata Reichenow. The Yellow-collared Lovebird, A. personata, is distinguished by its black head, yellow neck and green rump; Fischer's Lovebird by its peach-coloured head and violet rump. Both species have dark green wings and backs, with a lighter green belly, tomato-red beak, white-rimmed eyes and grey feet. The sexes are indistinguishable. The two species have very similar habits.

Both species occur naturally in central Tanganyika and have also been introduced to the coast at Tanga and Dar es Salaam. The type of country they inhabit is typical Nyika - rather dry acacia country, sparsely wooded and dotted with baobab trees.

About eight years ago I obtained five specimens of A. personata, housing them in an outdoor aviary measuring about ten feet long, five feet broad and seven feet high. Three years later we obtained three specimens of A. fischeri. Although Nairobi is about two thousand feet higher than their native habitat, with corresponding differences in climate and vegetation, both species seem to thrive here, two years ago their numbers reached a peak of sixty, all descended from the original eight birds.

The birds are provided with nesting boxes, sunflower seed and water; otherwise they are left to fend for themselves. Eighteen months ago I made some holes in the aviary so that the birds are now able to enter and leave at will. No particular effort has been made to tame the birds. Over the eight years or so I have noticed the following features:-

1. Both species appear to eat only plant foods, and their main food consists of seeds, such as sunflower, millet and grass seeds. Both species have a habit of chewing blades of grass, as if to extract the juices. I have never seen the birds eating fruit.

2. Both species have a similar variety of calls, consisting of squawks and squeaking twitters, although I have not been able to discover the significance of the variations. Occasionally several birds will squawk intermittently, almost in turn as it were, continuing this performance for ten or twenty seconds, until one or more of the birds will suddenly burst out with a torrent of high-pitched twittering. Once again, I cannot see any reason for this peculiar habit. Generally A. fischeri is the more vociferous of the two species.

3. Both species make a rough nest of twigs inside the nesting boxes provided. Often a large mound of nesting material is placed next to the entrance, presumably to act as a wind-break. Mackworth-Praed and Grant mention that both species often block the entrance to the nest

with the thorns, but I have never seen this. However this may be due to the scarcity of acacia trees in the neighbourhood.

4. Both species appear to breed throughout the year, and do not follow any particular breeding season. In contrast Praed and Grant state that A. fischeri breeds between May and July; A. personata between March and August. A. fischeri appears to be the more prolific of the two species by breeding more often. Praed and Grant state that between five and seven young are produced in each brood, but three is the largest brood I have observed. According to Praed and Grant again, the young of A. fischeri have indistinct narrow barring, but I have never noticed this on any of my specimens.

The parent birds usually feed partially digested food to their young, and before disgorging the food, go through a series of hiccuping or vomiting motions. These appear to act as a stimulus to the young bird, for it immediately opens its beak and spreads its wings to ward off its brothers and sisters. Once, when trying to feed an abandoned young bird and meeting with little success, I tried going through the same motions of vomiting, this produced instant results for the young bird opened its beak and I was able to feed it. This method has worked with all the abandoned young I have since fed.

5. Perhaps the most interesting feature was the successful rearing of hybrid young, which has gone on for four years. These hybrids now account for about one third of the number of birds in the aviary. In appearance they are approximately midway between A. fischeri and A. personata, having a purple rump and yellowish neck; the head is a brown colour which shades to orange on the forehead. About a year ago I began to wonder if these hybrids were breeding, as I had seen them mating and also noticed that the colour of brown on the head varied considerably; on some birds it was almost black whilst other birds differed little from A. fischeri. This led me to suspect that some of the hybrids had successfully mated with specimens of one of their parents. In February of this year I obtained proof that this was so when I examined a nest at night and found it contained two parents, one a hybrid and one a specimen of A. fischeri, together with three young birds. The three young birds are now in mature plumage.

These observations have, of course, been made under somewhat artificial conditions, and this must be borne in mind when assessing their value. However one fact seems to stand out - the ability of the two species to interbreed. If one accepts that a separate species is a group of organisms which are capable of interbreeding with one another to produce fertile young, then it may be that A. fischeri and A. personata are not separate species but merely races or sub-species of one species. In any event, these two lovebirds are well worth further study.

(Received for publication 25th. April 1964)

A KEY AND CHECK LIST TO KENYA ORCHIDS

By

G.C. Copley, E.M. Tweedie and E.W. Carroll

Part II

The Check List

Continued from J.E.Afr.Nat.Hist.Soc. Vol.XXIV No.4 (108) p.58, Jan. 1964.

Tribe I. OPHRYDEAE

HABENARIA Willd.
H. aequatorialis Rendle = H. stylites Rchb.f. & S. Moore ssp. stylites
H. altior Rendle
H. armatissima Rchb.f.
H. bracteosa Hochst. ex A. Rich.
H. cavatibrachia Summerh.
H. chirensis Rchb.f.
H. chlorotica Rchb.f.
H. cirrhata Rchb.f.
H. cornuta Lindl.
H. cuculifera Rendle = H. humilior Rchb.f.
H. decorata Hochst.
H. egregia Summerh.
H. epipactidea Rchb.f.
H. filicornis Lindl.
H. foliolosa Krzl. = H. njamnjamica Krzl.
H. helicoplectrum Summerh.
H. hochstetteriana Krzl. = H. humilior Rchb.f.
H. hologlossa Summerh.
H. holubii Rolfe
H. huillensis Rchb.f.
H. humilior Rchb.f.
H. keniensis Summerh.
H. kilimanjari Rchb.f.
H. laurentii De Wild.
H. limnophila Summerh. = H. chirensis Rchb.f.
H. linderi Summerh.
H. lindblomii Schltr.
H. lykipiensis Rolfe = H. altior Rendle
H. macrantha Hochst. ex A. Rich.
H. macrura Krzl.
H. macruroides Summerh.
H. malacophylla Rchb.f.
H. ndiana Rendle
H. njamnjamica Krzl.
H. peristyloides A. Rich.
H. petitiana (A. Rich.) Dur. & Schinz
H. plectromaniaca Rchb.f. & S. Moore
H. quartiniana A. Rich.
H. rendlei Rolfe = H. peristyloides A. Rich.
H. ruwenzoriensis Rendle = H. cornuta Lindl.

NOTE: Names which are underlined are synonyms.

H. schimperiana Hochst. ex A. Rich.
H. splendens Rendle
H. stylites Rchb.f. & S. Moore ssp. stylites
H. thomsonii Rchb.f.
H. trilobulata Schltr.
H. tweedieae Summerh.
H. vaginata A. Rich.
H. walleri Rchb.f.
H. zambesina Rchb.f.

BONATEA Willd.
Bonatea arabica (Deflers) Cortesi
= B. steudneri (Rchb.f.) Dur. & Schinz
B. rabaiensis Rolfe
B. steudneri (Rchb.f.) Dur. & Schinz
B. tentaculifera Summerh.
B. ugandae Rolfe ex Summerh. = B. steudneri (Rchb.f.) Dur. & Schinz
B. volkensiana Rolfe

BRACHYCORYTHIS Lindl.
Brachycorythis buchananii (Schltr.) Rolfe
B. kalbreyeri Rchb.f.
B. grandis Krzl. var. ugandensis Braid
= B. ovata. Lindl. ssp. schweinfurthii (Rchb.f.) Summerh.
B. ovata Lindl. ssp. schweinfurthii (Rchb.f.) Summerh.
B. pleistophylla Rchb.f. ssp. pleistophylla
B. pubescens Harv.
B. tenuior Rchb.f.

CYNORKIS Benth. & Hook.
Cynorkis anacamptoides Krzl.
C. braunii Krzl. = C. buchwaldiana Krzl. ssp. braunii (Krzl.) Summerh.
C. buchwaldiana Krzl. ssp. braunii (Krzl.) Summerh.
C. kassneriana Krzl.

DEROEMERA Rchb.f. = Holothrix A. Rich.
Deroemera acuminata Rendle & Schltr.
= Holothrix aphylla (Forsk.) Rchb.f.
D. pentadactyla Summerh. = Holothrix pentadactyla (Summerh.) Summerh.

HOLOTHRIX A. Rich.
Holothrix aphylla (Forsk.) Rchb.f.
H. arachnoidea (A. Rich.) Rchb.f.
H. elgonensis Summerh.
H. pentadactyla (Summerh.) Summerh.
H. puberula Rendle

PERISTYLUS Blume
Peristylus petitianus A. Rich.
= Habenaria petitiana (A. Rich.) Dur. & Schinz

PLATYCORYNE Rchb.f.
Platycoryne crocea (Schweinf. ex Rchb.f.) Rolfe ssp. crocea
P. montis-elgon (Schltr.) Summerh.
= P. crocea (Schweinf. ex Rchb.f.) Rolfe ssp. montis-elgon (Schltr.) Summerh.
ROEPEROCHARIS Rchb.f.
Roeperocharis bennettiana Rchb.f.

DISA Berg.
Disa bakeri Rolfe = D. stairsii Krzl.
D. concinna N.E.Br.
D. deckenii Rchb.f.
D. erubescens Rendle
D. hircicornis Rchb.f.
D. ochrostachya Rchb.f.
D. schimperi N.E.Br. = D. scutellifera A. Rich.
D. scutellifera A. Rich.
D. stairsii Krzl.
D. subaequalis Summerh. = D. welwitschii Rchb.f.
D. welwitschii Rchb.f.

SATYRIUM Swartz
Satyrium carsoni Rolfe
S. coriophoroides A. Rich.
S. crassicaule Rendle
S. dizygoceras Summerh. = S. volkensii Schltr.
S. fimbriatum Summerh.
S. sacculatum (Rendle) Rolfe
S. sceptrum Schltr.
S. schimperianum Hochst.
S. speciosum Rolfe
S. volkensii Schltr.

DISPERIS Swartz
Disperis anthoceros Rchb.f.
D. aphylla Krzl.
D. dicerochila Summerh.
D. kilimanjarica Rendle
D. nemorosa Rendle
D. reichenbachiana Welw. ex Rchb.f.

Tribe 2 NEOTTIEAE

EPIPOGIUM Gmel.
Epipogium roseum (Don.) Lindl. (Saprophytic)

EPIPACTIS R. Br.
Epipactis africana Rendle

NERVILIA Gaud.
Nervilia kotschyi (Rchb.f.) Schltr.

VANILLA Swartz
Vanilla roscheri Rchb.f.

Tribe 3. EPIDENDREAE

LIPARIS (A. Rich.) Benth. & Hook.
Liparis neglecta Schltr.
L. odontochilus Summerh.

OBERONIA Lindl.
Oberonia brevifolia Lindl. = O. disticha (Lam.) Schltr.
O. disticha (Lam.) Schltr.

CALANTHE R. Br.
Calanthe corymbosa Lindl.
C. volkensii Rolfe

BULBOPHYLLUM Thou.
Bulbophyllum bequaertii De Wild. var. brachyanthum Summerh.
B. cochleatum Lindl.
B. congolanum Schltr.
B. encephalodes Summerh.
B. falcatum Rchb.f.
B. intertextum Lindl.
B. nyassanum Schltr. = B. oxypterum (Lindl.) Rchb.f.
B. oxypterum (Lindl.) Rchb.f.
B. schlechteri De Wild.
B. viride Rolfe = B. intertextum Lindl.

Tribe 4. VANDEAE

POLYSTACHYA Hook.
Polystachya adansoniae Rchb.f.
P. albescens Ridl. ssp. kraenzlinii (Rolfe) Summerh.
P. aristulifera Rendle = P. simplex Rendle
P. bella Summerh.
P. bicarinata Rendle
P. campyloglossa Rolfe
P. coriacea Rolfe = P. golungensis Rchb.f.
P. cultriformis (Thou.) Spreng. ex Lindl.
P. eurychila Summerh.
P. eurygnatha Summerh.
P. fusiformis (Thou.) Lindl.
P. golungensis Rchb.f.
P. imbricata Rolfe
= P. albescens Ridl. ssp. kraenzlinii (Rolfe) Summerh.
P. inconspicua Rendle
P. isochiloides Summerh.
P. kraenzlinii Rolfe
= P. albescens Ridl. ssp. kraenzlinii(Rolfe) Summerh.
P. latilabris Summerh.
P. miranda Krzl. = P. tayloriana Rendle
P. nigrescens Rendle = P. transvaalensis Schltr.
P. repens Rolfe = Stolzia repens (Rolfe) Summerh.
P. shega Krzl.
P. simplex Rendle
P. spatella Krzl.
P. steudneri Rchb.f.
P. stricta Rolfe
P. stuhlmannii Krzl.
P. tayloriana Rendle
P. tessellata Lindl.
P. transvaalensis Schltr.
P. ugandae Krzl.
P. vaginata Summerh.

STOLZIA Schltr.
Stolzia repens (Rolfe) Summerh.

ANSELLIA Lindl.
A. africana Lindl.
A. gigantea Rchb.f. var. nilotica (Bak.) Summerh.

EULOPHIA Lindl.
Eulophia adenoglossa (Lindl.) Rchb.f
E. angolensis (Rchb.f.) Summerh.
E. bella N.E.Br. = E. orthoplectron (Rchb.f.) Summerh.
E. calantha Schltr.
E. caloptera (Rchb.f.) Summerh.
E. chlorotica Krzl.
E. cucullata (Sw.) Steud.
E. galeoloides Krzl. (Saprophytic)
E. grantii (Rchb.f.) Summerh.
E. guineensis Lindl.
E. horsfallii (Batem.) Summerh.
E. involuta Summerh.
E. latilabris Summerh.
E. lindleyana (Rchb.f.) Schltr. = E. angolensis (Rchb.f.) Summerh.
E. livingstoniana (Rchb.f.) Summerh.
E. milanjiana (Rendle) Krzl. = E. zeyheri Hook.f.
E. montis-elgonis Summerh.
E. orthoplectron (Rchb.f.) Summerh.
E. paivaeana (Rchb.f.)Summerh. ssp.borealis Summerh. and ssp.paivaeana
E. parvula (Rendle) Summerh.
E. petersii (Rchb.f.) Rchb.f. = E. schimperiana A. Rich.
E. porphyroglossa (Rchb.f.) Bolus
E. propinqua Hutch. = E. shupangae (Rchb.f.) Krzl.
E. pyrophila (Rchb.f.) Summerh.
E. quartiniana A. Rich.
E. schimperiana A. Rich.
E. shupangae (Rchb.f.) Krzl.
E. stachyodes Rchb.f.
E. stenophylla Summerh.
E. subulata Rendle
E. wakefieldii (Rchb.f. & S. Moore) Summerh.
E. warneckeana Krzl.
E. zeyheri Hook.f.

LISSOCHILUS R.Br.
Lissochilus arenarius Lindl. = Eulophia cucullata (Sw.) Steud.
L. bellus Schltr. = E. orthoplectron (Rchb.f.) Summerh.
L. mediocris Rendle = E. livingstoniana (Rchb.f.) Summerh.
L. milanjianus Rendle = E. zeyheri Hook.f.
L. oliverianus Rchb.f. = E. paivaeana (Rchb.f.) Summerh. ssp. borealis Summerh.
L. paludicolus Rchb.f. = E. angolensis (Lindl.) Summerh.
L. volkensii Rolfe

PTEROGLOSSASPIS Rchb.f.
Pteroglossaspis engleriana Krzl.
P. eustachya Rchb.f.
P. ruwenzoriensis Rolfe

ACAMPE Lindl.
Acampe mombasensis Rendle
A. pachyglossa Rchb.f.

ANGRAECUM Bory.
Angraecum dives Rolfe
A. erectum Summerh.
A. giryamae Rendle
A. humile Summerh.
A. sacciferum Lindl.
A. viride Krzl.

AERANGIS Rchb.f.
A. coriaceae Summerh.
A. floribunda Summerh. = Rangaeris musicola (Rchb.f.) Summerh.
A. friesiorum Schltr.
A. kirkii (Rolfe) Schltr.
A. kotschyana (Rchb.f.) Schltr.
A. rhodosticta (Krzl.) Schltr.
A. thomsonii (Rchb.f.) Schltr.
A. ugandensis Summerh.

ANGRAECOPSIS Krzl.
Angraecopsis amaniensis Summerh.
A. breviloba Summerh.
A. gracillima (Rolfe) Summerh.
A. tenerrima Krzl.

BOLUSIELLA Schltr.
Bolusiella imbricata (Rolfe) Schltr.
B. iridifolia (Rolfe) Schltr.

CHAMAEANGIS Schltr.
Chamaeangis odoratissima (Rchb.f.) Schltr.
C. orientalis Summerh.
C. vesicata (Lindl.) Schltr.

CYRTORCHIS Schltr.
Cyrtorchis arcuata (Lindl.) Schltr. ssp. variabilis Summerh.
C. praetermissa Summerh.
C. sedeni (Rchb.f.) Schltr.
= C. arcuata (Lindl.) Schltr. ssp. variabilis Summerh.

DIAPHANANTHE Schltr.
Diaphananthe fimbriata (Rolfe) Schltr.
= D. fragrantissima (Rchb.f.) Schltr.
D. fragrantissima (Rchb.f.) Schltr.
D. lorifolia Summerh.
D. pulchella Summerh.
D. quintasii (Rolfe) Schltr.
D. rutila (Rchb.f.) Summerh.
D. subsimplex Summerh.
D. xanthopollinia (Rchb.f.) Summerh.

MICROCOELIA Lindl.
Microcoelia exilis Lindl.
M. guyoniana (Rchb.f.) Summerh.
M. koehleri (Schltr.) Summerh.
M. pachystemma Summerh. = M. koehleri (Schltr.) Summerh.
M. smithii (Rolfe) Summerh.

NEPHRANGIS (Schltr.) Summerh.
Nephrangis filiformis (Krzl.) Summerh.

RANGAERIS (Schltr.) Summerh.
Rangaeris amaniensis (Krzl.) Summerh.
R. brachyceras (Summerh.) Summerh.
R. muscicola (Rchb.f.) Summerh.

RHIPIDOGLOSSUM Schltr.
Rhipidoglossum rutilum (Rchb.f.) Schltr.
= Diaphananthe rutila (Rchb.f.) Summerh.
R. xanthopollinium Schltr. = D. xanthopollinia (Rchb.f.) Summerh.

TRICERATORHYNCHUS Summerh.
Triceratorhynchus viridiflorus Summerh.

SOLENANGIS Schltr.
Solenangis aphylla (Thou.) Summerh.

TRIDACTYLE Schltr.
Tridactyle anthomaniaca (Rchb.f.) Summerh.
T. bicaudata (Lindl.) Schltr.
T. fimbriata Schltr. = T. bicaudata (Lindl.) Schltr.
T. furcistipes Summerh.
T. scottellii (Rendle) Schltr.
T. teretifolia Schltr.
T. tridentata (Harv.) Schltr. var. subulifolia Summerh.
T. virgula (Krzl.) Schltr.
T. wakefieldii (Rolfe) Summerh.

YPSILOPUS Summerh.
Ypsilopus longifolia (Krzl.) Summerh.

(Received for publication 9th. April 1964)

NATURE NOTES

Anting Behaviour in the Bronze Sunbird

Observations have frequently been made of a behaviour pattern, known as "anting", exhibited by birds such as the European Starling Sturnus vulgaris Linnaeus. This behaviour usually takes the form of seizing an ant or ants in the bill and rapidly brushing them under an extended wing.

On 16th. April 1964 we observed an adult male Bronze Sunbird Nectarina kilimensis Shelley at Sanderson Road, Spring Valley, Nairobi which was apparently "anting". At about 8.00 a.m., in light rain, the sunbird perched on a vine outside a window so that it could be observed at close range for some five minutes. The bird frequently appeared to seize something in its bill and brush it under a fluttering, partly extended wing. This sometimes involved either wing alternately, sometimes one wing two or three times consecutively. In a period of 30 seconds the operation occurred 15 times. Although nothing could be seen in the bill during these movements examination of the vine and the adjacent wall afterwards, at both of which the bird pecked, showed numbers of small black ants to be present.

D.R.M. & J. Stewart. 16/4/64

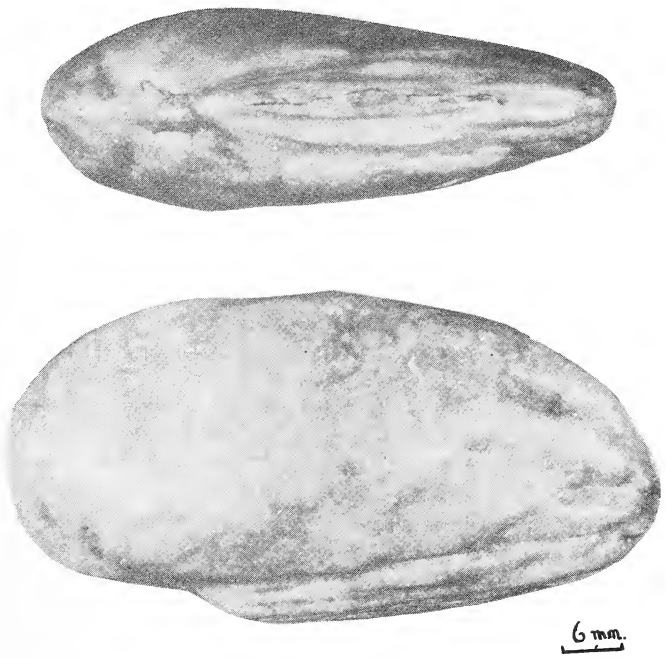
Fossil Seeds and Parrot Fish Bones.

It seems worth putting on record, to assist future museum workers, that certain abnormal bony structures developed on the bones of parrot fishes (Callyodontidae), look very like fruits or seeds. On two occasions, material has been submitted to the East African Herbarium for naming which appeared to be seeds but later turned out to be animal in origin, despite the fact that several august botanists had declared them to belong to a genus in the Sapotaceae! One lot originated from town rubbish filling a tomb at Gedi dated 1399, and was submitted by Mr. J. Kirkman, and the other, consisting of three "seeds", was found associated with Arab pottery of the 11th century by Mr. D.R. Moors. The animal origin of the material is easily observed by examining a thin slice of the material, whereupon the cellular structure may be seen, or by burning a small slither and noting the typical burnt hair and skin odour. Dr. Metcalfe of Kew, to which organisation the Kirkman specimen was finally sent, first suspected that the objects were bones, but they were not associated with fish until three appeared in a bucket in which a fish skeleton was being prepared and were sent to Mr. N. Mitton of the Coryndon Museum. They probably came from the head. I submitted one of Mr. Moors' specimens to the British Museum (Nat. Hist.) and Mr. P.J. Whitehead commented on it. I reproduce some of his letter here:

"We have a few examples here of hyperostosis, the most striking being in skeletons of bat fish (Platax pinnatus). There are no examples amongst Scaridae, but our skeletons are all from small fishes and this seems to occur mostly in large fishes (although I have seen something akin to it in Tilapia of about 20 cm.). It is also known in the Sparidae. In our specimens of Platax these nodules occur at the bases of the first pterygiophores of both anal and dorsal fins, on neural and haemal spines, on ribs, and in one case as an outgrowth on the supraoccipital. The example which you sent is unusual in that there is no indication of what bone it has been derived from. It could perhaps have been an outgrowth from some part of the skull which had such a slender line of attachment that it broke off leaving only a faint mark along one edge. One thing that puzzles me is that the outgrowths in Platax could not be mistaken for seeds; in all our specimens the swelling is clearly associated with a particular bone. The examples which you mention in your Nat.Hist. J. note seem to me to be a special case of hyperostosis, arising perhaps from a particular bone, and for some reason developing into a discrete nodule rather than a swelling. I can hazard no guess as to the 'function' of these outgrowths. They are not a normal part of the skeleton but appear probably only in some large fishes."

If any more similar outgrowths are found by persons dealing with large fish, Mr. Whitehead would like to know with what bones they are associated and the identity of the fish concerned.

B. Verdcourt. 30/1/64



REVIEW

A NEW JOURNAL.

In August 1963 a new journal, East African Wildlife Journal, was published under the auspices of the East African Wild Life Society.* This first issue contains 131 pages of print and opens with a foreword by the well known author Elspeth Huxley. Its contents are grouped into three sections; after the foreword there are papers on:- Observations on East African Birds of Prey by the authority on this subject, L.H. Brown; Animal Husbandry Research and Wild Life in East Africa by H.P. Ledger; The Elephant Problem at Tsavo by J. Glover; Some Preliminary Observations on the Food of Elephants in the Tsavo Royal National Park (East) of Kenya by P. Napier Bax and D.L.W. Sheldrick; The Black Rhinoceros by the late A.T.A. Ritchie; Ecological Separation of the Large Mammal Species in the Tarangire Game Reserve, Tanganyika by H.F. Lamprey and The Arabian Oryx by D.R.M. Stewart.

The second section covers research items; these are:- A Babesia of the African Elephant by D.W. Brocklesby and Heather Campbell; An Arabian Leopard by P.R. Tyrrell; Average Chemical Composition of Kenya Grasses, Legumes and Browse by H.W. Dougall; Wildlife Census - Lake Rudolf by D.R.M. Stewart; Breeding Data: Steinbok by G. Chalmers; The Gestation and Parturition of the African Buffalo by Brenda O. Vidler, A.M. Harthoorn, D.W. Brocklesby and D. Robertshaw; On the Chemical Composition of Elephant Faeces by H.W. Dougall; Weights of Some East African Mammals by H.P. Ledger; The Stomoxys Plague in Ngorongoro 1962 by H.A. Fosbrooke, and Translocation of Uganda Kob by the Kenya Game Department.

The third and final section covers Conferences:- First World Conference on National Parks by M. Cowie and C.C.T.A's. Annual Conference - 1963 by G.G. Waterson.

For the printing glossy paper is used and the matter is set up in two columns on the page, the size of the page being 7 x 9½ ins. This number is profusely illustrated with photographs, line drawings, maps, graphs and tables, the glossy paper lending itself to the clear reproduction of the photographs. The authors are experts in their particular subjects and workers in Agriculture, Animal Husbandry, Forestry, Game Departments, Grassland Research, National Parks and Veterinary Services have contributed to this issue.

This number is bound in a stiff cover with a dark green Belacron binding and gold lettering along with an Impala head is used for the title, volume, month and year of publication giving the Journal a neat and business-like appearance and the printing is excellent. The binding however is an extravagance as the covers will have to be ripped off when the numbers are bound into a volume, and in any case if they are not they cannot be used as single numbers because there

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* It is to appear annually, every August, and the annual subscription is Shs. 15/- within East Africa and Shs. 17/6 (U.S.$ 2.50) elsewhere including postage.

is no title or number on the spine and as most scientific journals are published with paper backs, why add to the cost of production.

The Journal is intended for the publication of papers on all aspects of research concerning wildlife and papers are not limited to matters concerned only with East Africa; this first issue covers Kenya, Tanganyika, Uganda and Arabia. Brief observations are also acceptable for publication in the section Research Notes.

The Editorial Committee are to be congratulated on the publication, of this, their first issue, and the price is very reasonable. One hopes they will be able to keep up such a very high standard of production when so many well known scientific journals are having to increase the subscriptions to their journals owing to the ever increasing cost of printing and publication of such specialized journals, which after all have only a rather limited reading public; even a well known Nairobi daily paper has had to increase its price owing to the increased cost of its production.

P.J.G.

APPRECIATION

The Late Mr. Cecil S. Webb.

It is with deep regret that we record the death on the 10th. April, 1964 of Mr. Cecil S. Webb, Curator of the Coryndon Museum Snake Park at the age of 66 after a brief illness.

"Webbie", as he was known to his many friends, settled in Kenya in 1957 after retirement from the directorship of the Dublin Zoo, Phoenix Park, Ireland: but life in retirement did not satisfy his active temperament and a few years later, on the 1st. January 1962, he accepted an invitation to become Curator of the Coryndon Museum Snake Park. Under his direction the snake park attained to the position it now holds as a popular attraction and a scientific institution of repute. At the time of his death Mr. Webb was planning further major alterations and improvements.

After World War I, in which he served as a gunner, Cecil Webb was appointed an official curator-collector for the London Zoo. In this capacity he travelled widely for over twenty years to many parts of the world collecting rare animals and birds. He was responsible for introducing many species of birds and animals never before seen in captivity. In 1946 he was made Curator of Birds and Mammals at the London Zoo, and he held this position until 1952 when he was appointed the Director of the Dublin Zoo.

Cecil Webb was a man of great charm and he possessed a keen sense of humour. He will be missed greatly by his wide circle of friends who extend their deepest sympathy to his wife in her irreparable loss.

J.G.W.

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